

Analysis of Crossed Dipole in Circular Cavity

Summary of Results

Aperture (λ)	Base (λ)	Depth (λ)	Gain dB	Beam- Width	Opt. f/D	Illum. Losses	Phase Ctr. (λ)	Band- Width	10 dB Beam
0.6	0.6	0.3	6.4	85.6	0.32	1.70	0.332	22%	182.5
0.6	0.6	0.5	7.2	82.1	0.36	1.94	0.503	15.%	171.3
0.7	0.7	0.3	7.4	79.0	0.36	1.66	0.334	28%	162
0.7	0.7	0.5	8.0	73.4	0.40	1.73	0.486	20%	147.3
0.8	0.8	0.5	8.7	68.6	0.44	1.57	0.478	37%	133
0.88	0.57	0.44	9.1	65.2	0.48	1.48	0.415	21%	123.3
0.9	0.9	0.3	9.0	65.6	0.44	1.44	0.303	27%	128.4
0.9	0.9	0.4	9.2	63.9	0.44	1.49	0.393	28%	123.6
0.9	0.9	0.5	9.3	63.5	0.48	1.48	0.474	32%	121.6
0.9	0.9	0.6	9.3	64.7	0.48	1.47	0.566	44%	120.6
1.0	1.0	0.3	9.7	61.1	0.48	1.43	0.291	23%	118.0
1.0	1.0	0.3	9.6	61.5	0.48	1.44	0.287	27%	119.0
1.0	1.0	0.4	9.8	59.9	0.52	1.51	0.393	26%	115.1
1.0	1.0	0.5	10.0	58.7	0.48	1.44	0.480	29%	111.3
1.0	1.0	0.6	10.0	59.2	0.56	1.59	0.580	28%	111.0
1.0	0.65	0.5	9.8	61.1	0.48	1.43	0.455	25%	114.8
1.1	1.1	0.4	10.5	55.4	0.56	1.94	0.289	20%	105.5
1.1	1.1	0.5	10.7	54.1	0.56	1.47	0.491	20%	101.9
1.1	1.1	0.6	10.8	54.1	0.60	1.76	0.583	28%	100.8
1.2	0.65	0.5	10.7	54.2	0.52	1.36	0.395	33%	102.9
1.3	0.65	0.5	11.2	51.0	0.56	1.37	0.364	28.5%	97.3
1.4	0.65	0.5	11.5	49.1	0.60	1.58	0.249	29%	95.4
1.5	0.65	0.5	11.7	47.7	0.56	1.60	0.208	24%	94.3
1.6	0.65	0.44	11.3	47.9	0.56	1.52	0.132	23%	96.4
1.7	0.65	0.44	11.1	47.3	0.52	1.54	0.102	26.5%	96.9
1.7	0.80	0.44	11.6	45.2	0.60	1.61	0.050	26%	90.7
1.7	0.90	0.44	12.1	43.3	0.68	1.65	0.037	24.5%	85.7
1.7	1.0	0.44	12.5	41.4	0.68	1.79	-0.035	22.5%	81.8
1.7	1.1	0.44	12.6	39.4	0.64	2.10	-0.164	21%	83.6
1.8	1.0	0.44	12.6	39.7	0.56	2.02	-0.160	23%	84.8

Chapter 5 Dipoles, Slots, and Loops

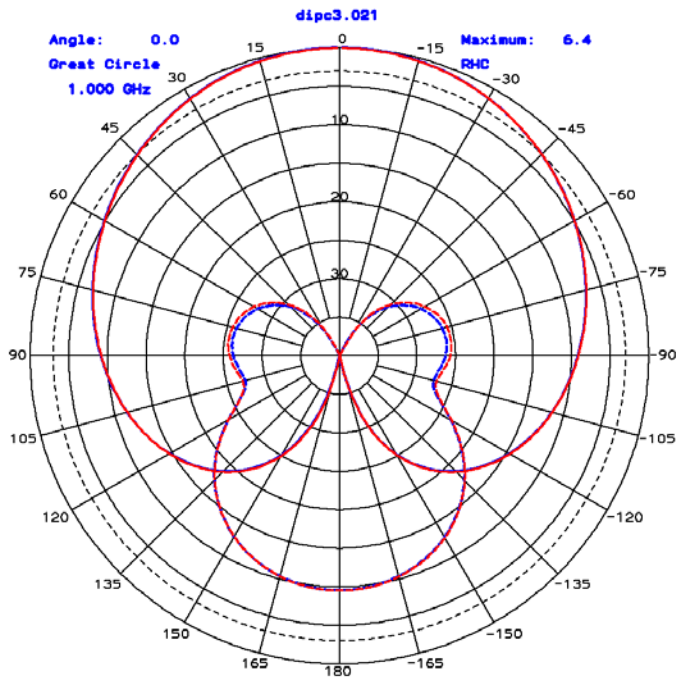
Aperture (λ)	Base (λ)	Depth (λ)	Dipole Length	Dipole Height	F/B Center	F/B Avg.
0.6	0.6	0.3	0.400	0.22	9.7	10.2
0.6	0.6	0.5	0.377	0.27	13.3	12.9
0.7	0.7	0.3	0.410	0.20	12.5	12.8
0.7	0.7	0.5	0.410	0.21	19.5	16.7
0.8	0.8	0.5	0.430	0.20	26.7	21.0
0.88	0.57	0.44	0.458	0.25	19.9	19.0
0.9	0.9	0.3	0.440	0.25	17.2	16.1
0.9	0.9	0.4	0.440	0.20	24.1	23.0
0.9	0.9	0.5	0.440	0.20	27.4	23.7
0.9	0.9	0.6	0.440	0.20	16.6	17.4
1.0	1.0	0.3	0.440	0.20	17.7	16.4
1.0	1.0	0.3	0.440	0.23	17.8	16.8
1.0	1.0	0.4	0.440	0.23	23.9	21.7
1.0	1.0	0.5	0.440	0.23	30.4	28.7
1.0	1.0	0.6	0.458	0.21	17.6	18.9
1.0	0.65	0.5	0.458	0.25	22.8	20.8
1.1	1.1	0.4	0.458	0.24	21.6	19.3
1.1	1.1	0.5	0.440	0.25	33.6	27.8
1.1	1.1	0.6	0.458	0.25	17.2	16.1
1.2	0.65	0.5	0.458	0.25	27.3	23.3
1.3	0.65	0.5	0.458	0.23	25.3	22.4
1.4	0.65	0.5	0.432	0.23	22.4	21.4
1.5	0.65	0.5	0.440	0.22	19.4	20.4
1.6	0.65	0.44	0.440	0.22	21.4	23.1
1.7	0.65	0.44	0.440	0.25	21.1	23.5
1.7	0.80	0.44	0.440	0.25	21.8	25.8
1.7	0.90	0.44	0.449	0.26	24.9	28.1
1.7	1.0	0.44	0.454	0.28	29.8	28.7
1.7	1.1	0.44	0.454	0.30	31.2	26.4
1.8	1.0	0.44	0.454	0.30	29.8	28.6

Straight wall designs

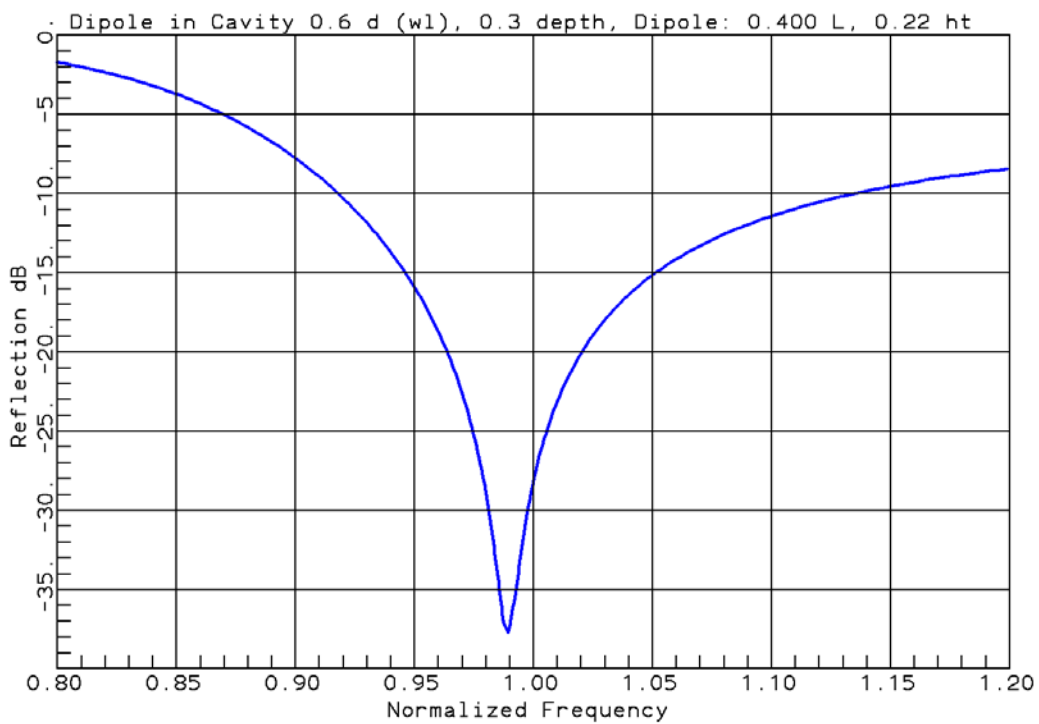
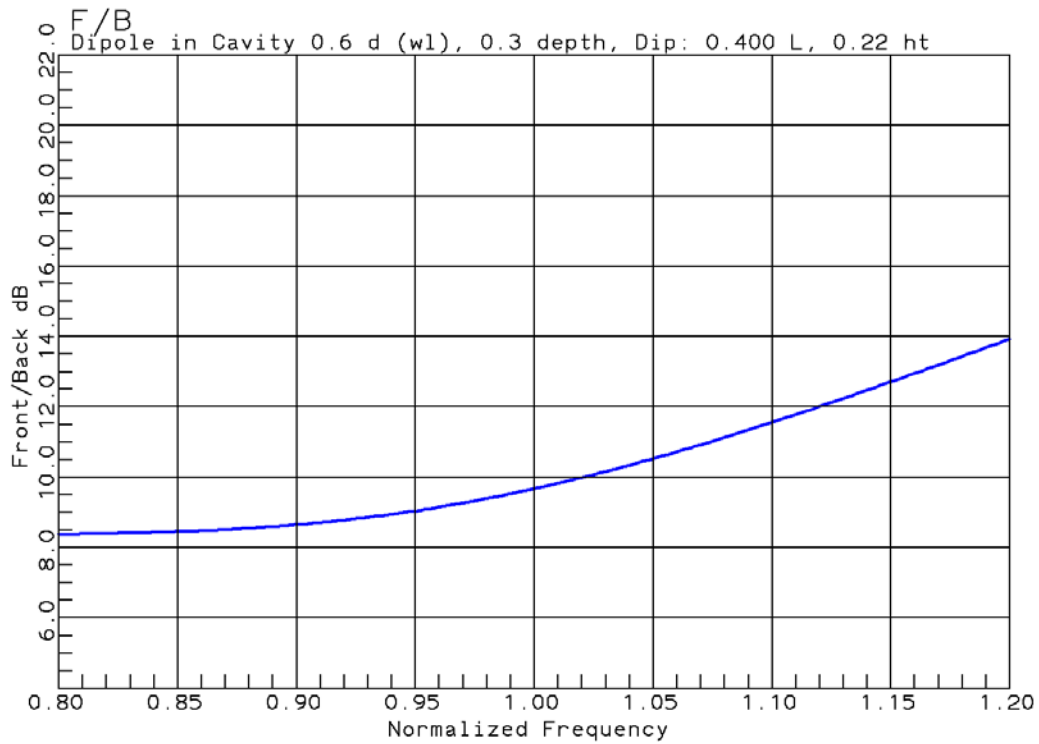
**Cavity: 0.6λ Diameter Aperture, 0.3λ Depth, Dipole: 0.418λ ,
Height: 0.214λ**

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

Crossed Dipole in Cavity 0.6λ d (wl), 0.3λ depth, Dipole: 0.418λ L, 0.214λ ht

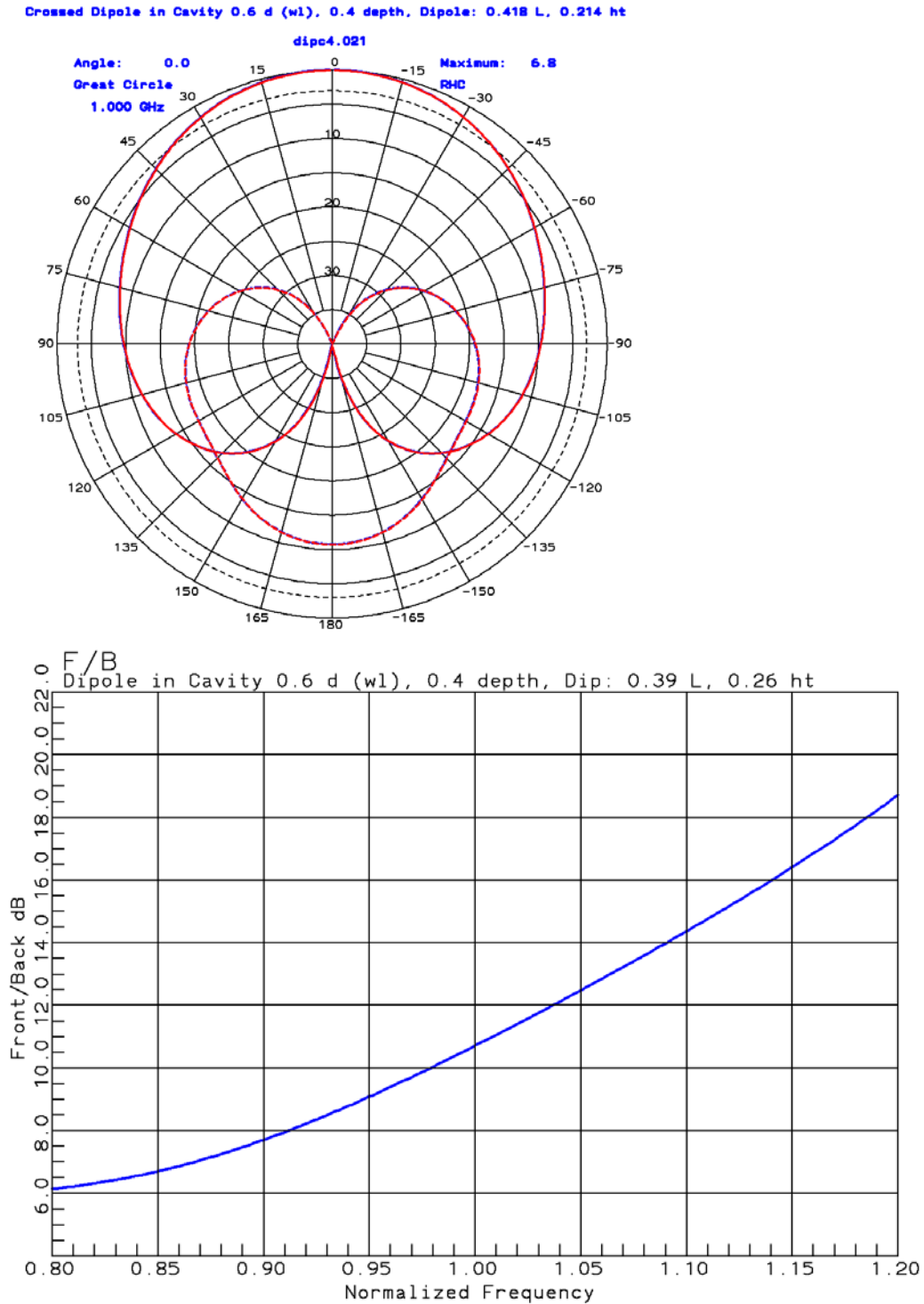


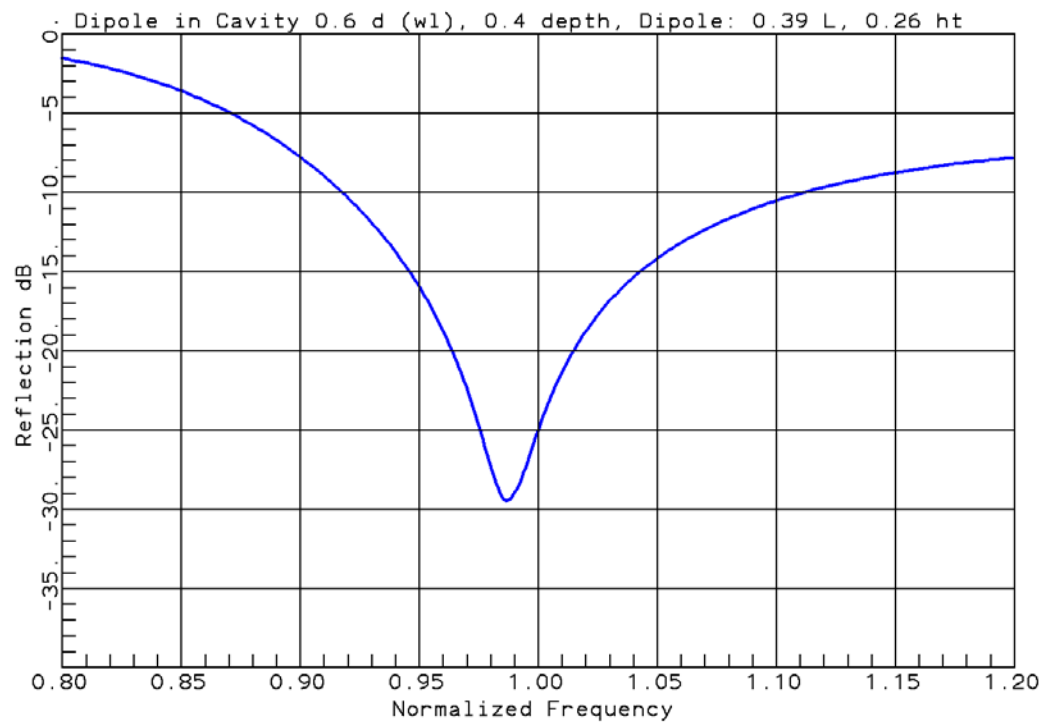
Chapter 5 Dipoles, Slots, and Loops



Cavity: 0.6λ Diameter Aperture, 0.4λ Depth, Dipole: 0.418λ , Height: 0.214λ

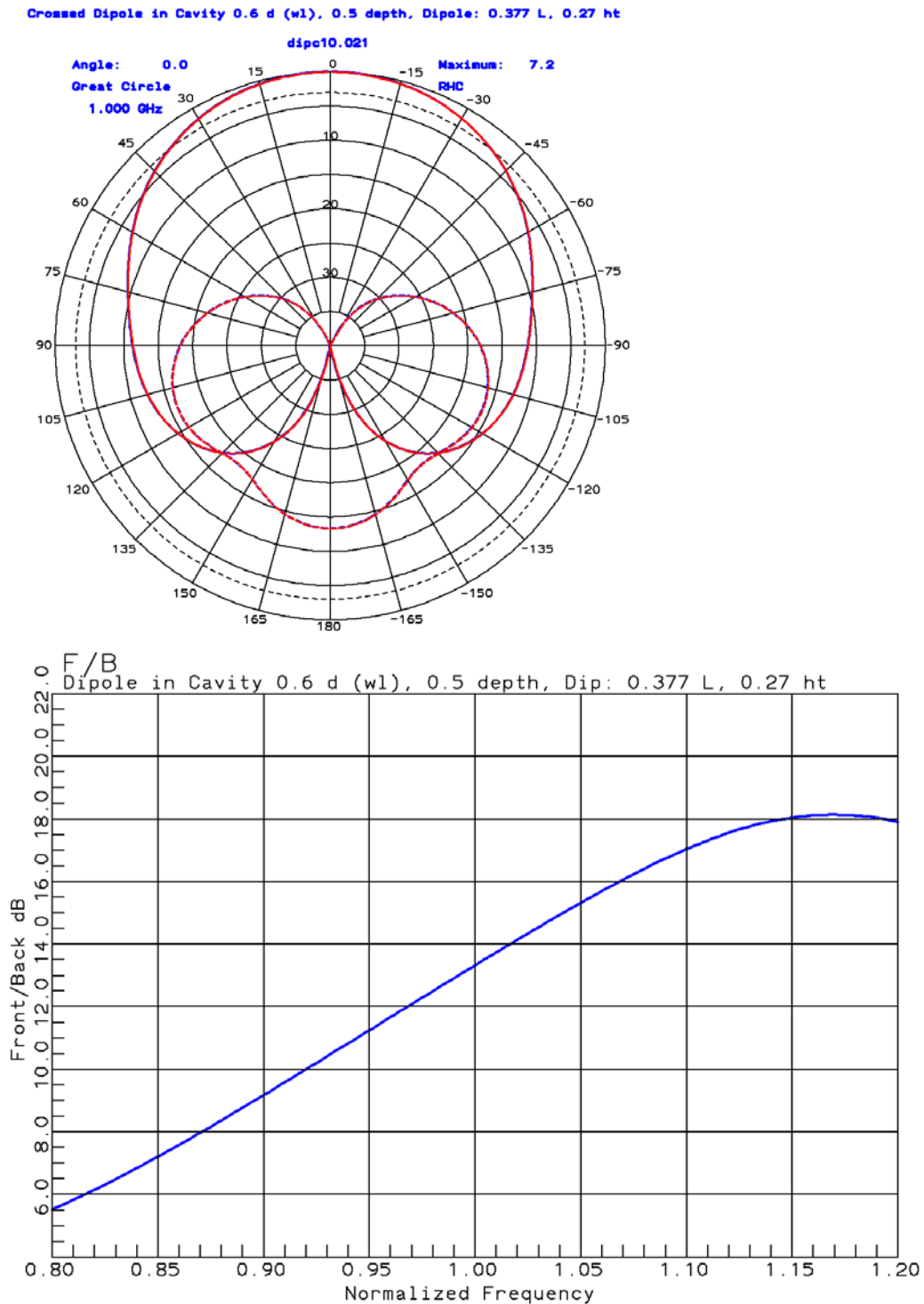
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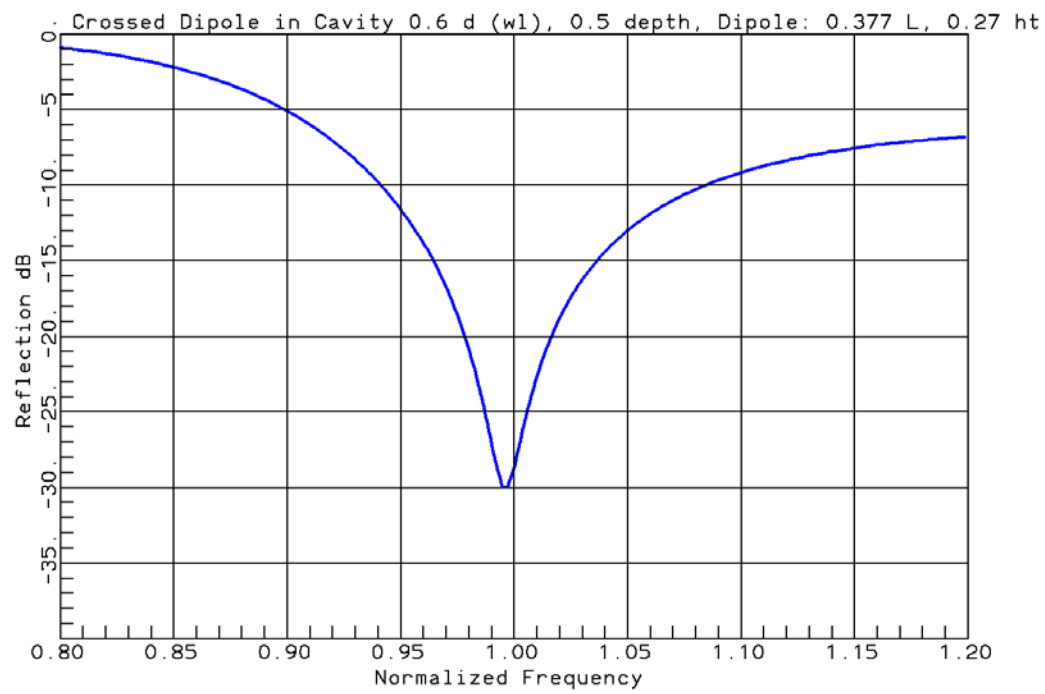




Cavity: 0.6λ Diameter Aperture, 0.5λ Depth, Dipole: 0.377λ , Height: 0.270λ

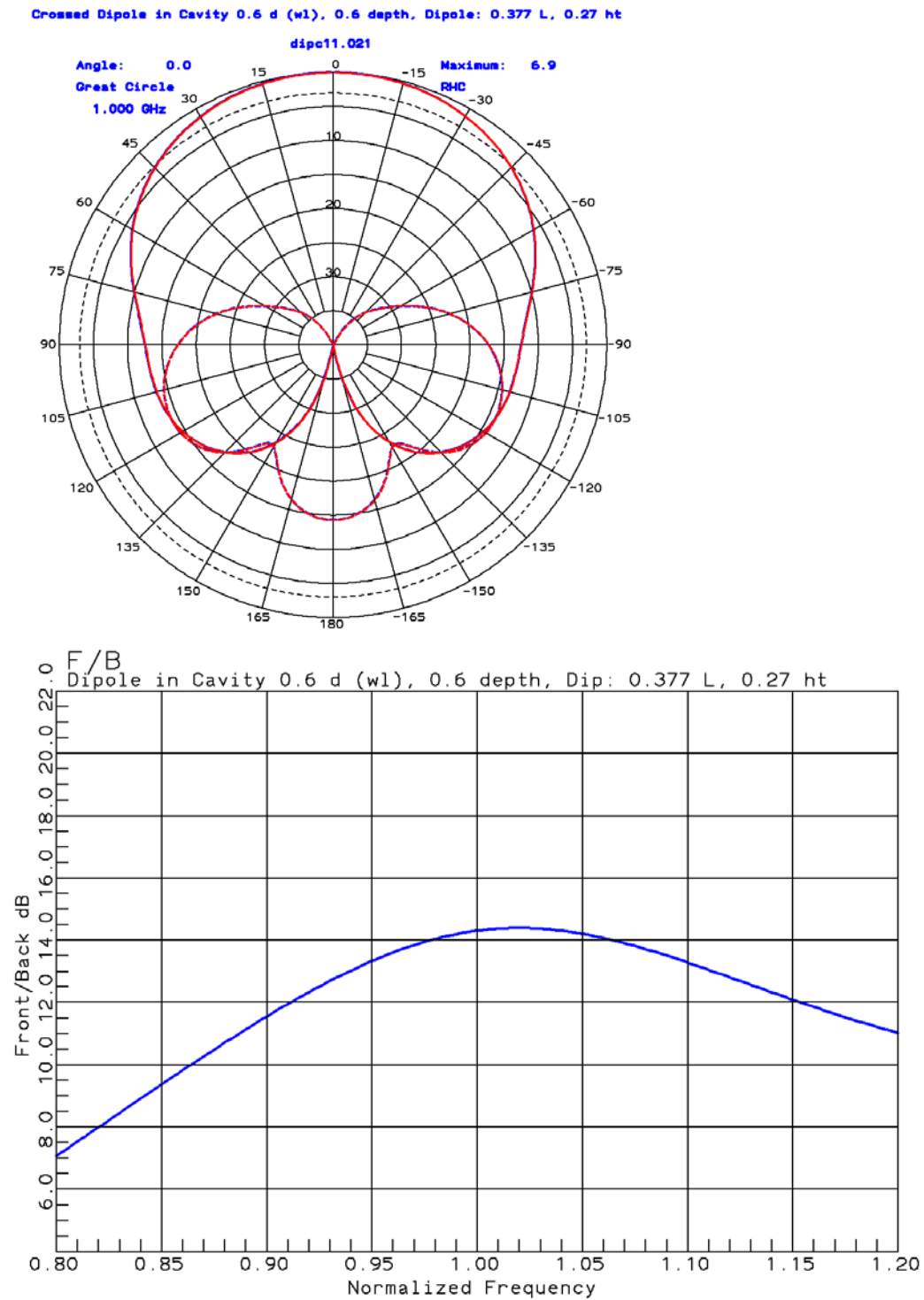
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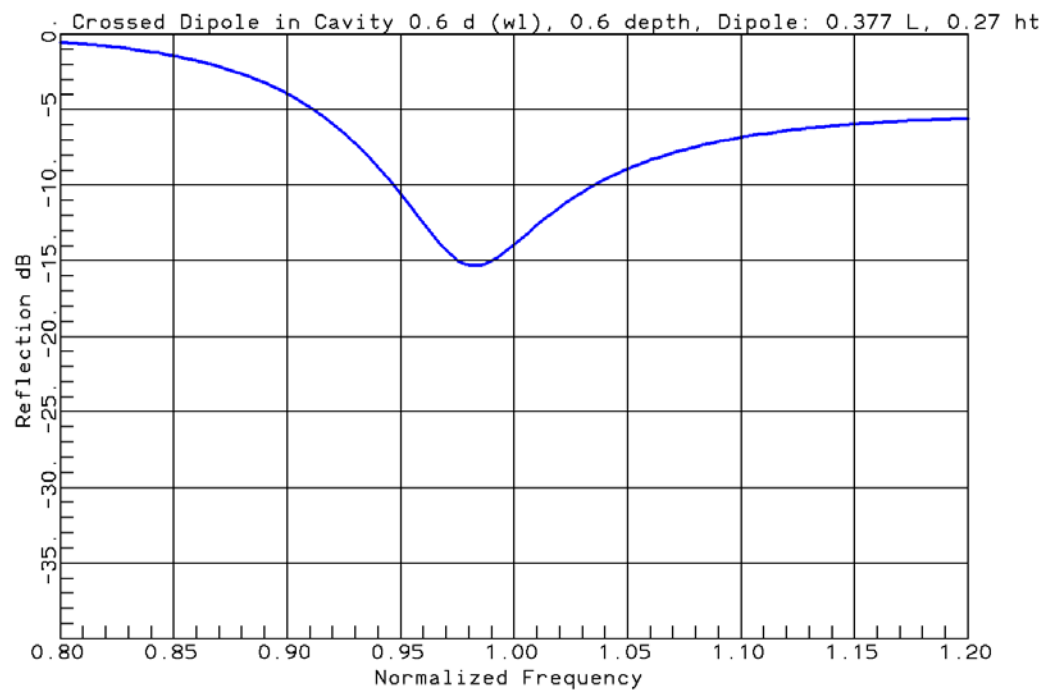




Cavity: 0.6λ Diameter Aperture, 0.6λ Depth, Dipole: 0.377λ , Height: 0.270λ

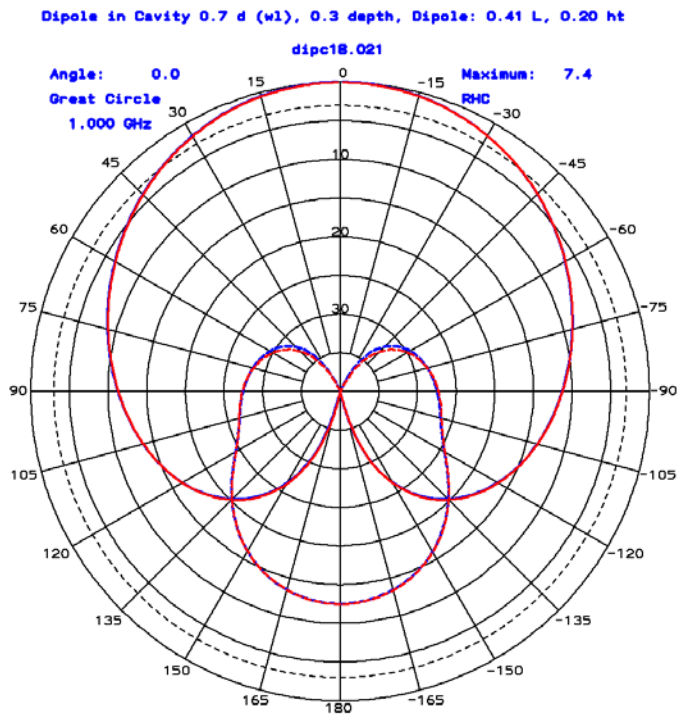
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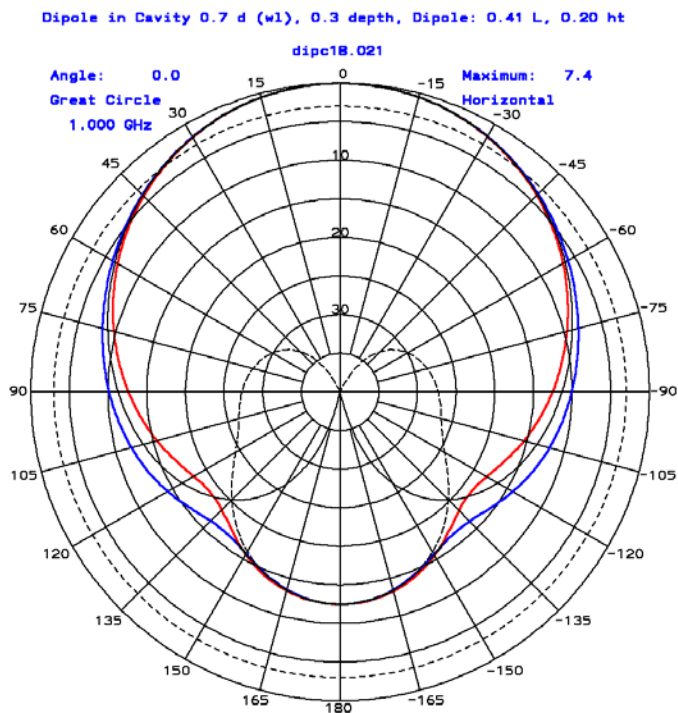


Cavity: 0.7λ Diameter Aperture, 0.3λ Depth, Dipole: 0.410λ , Height: 0.20λ

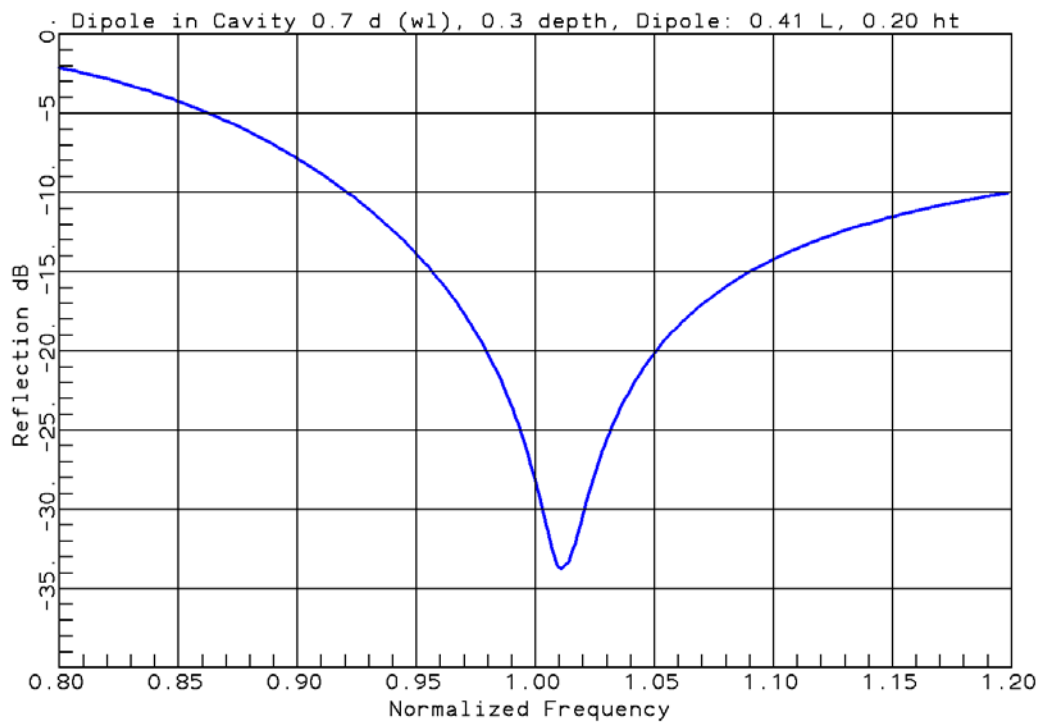
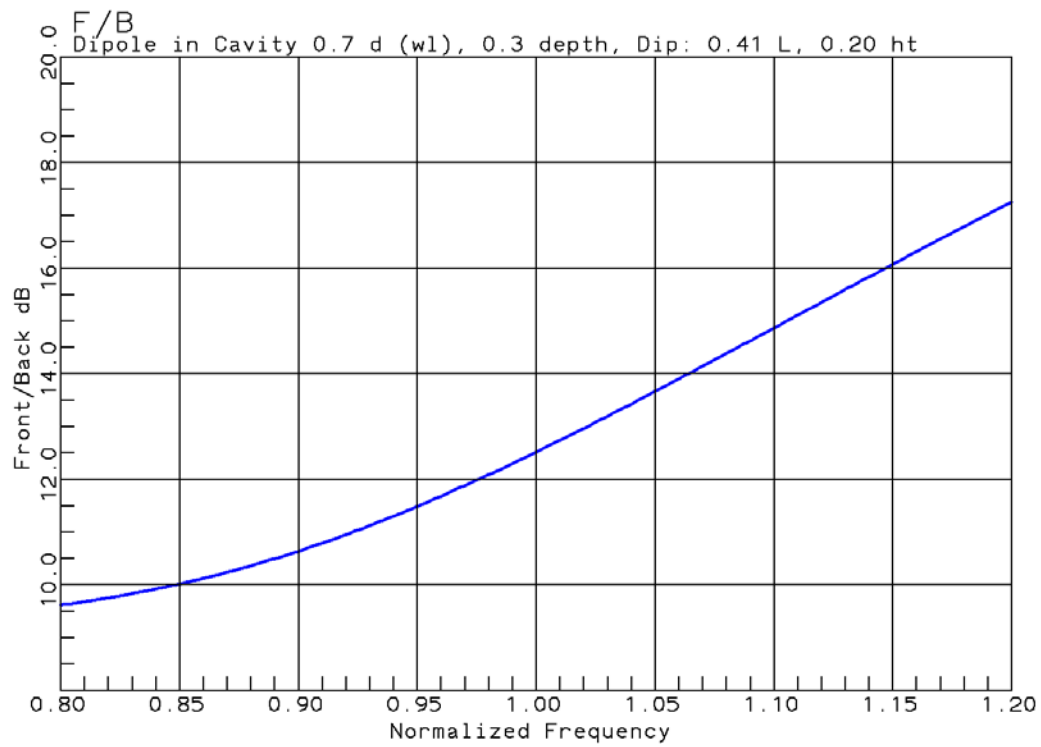
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



Linear Polarization Blue: $\varphi = 0$, Red: $\varphi = 90$, Black: $\varphi = 45$

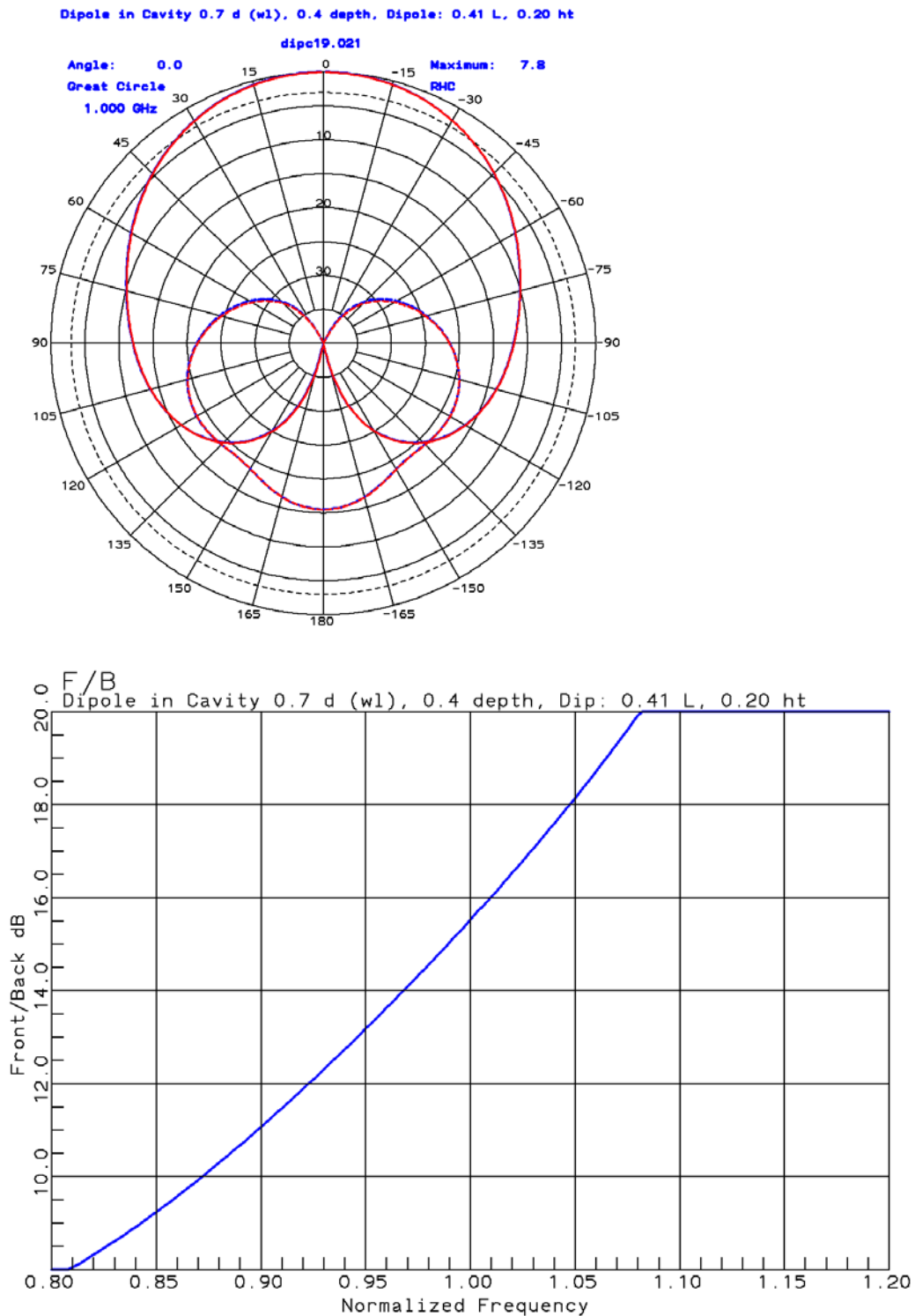


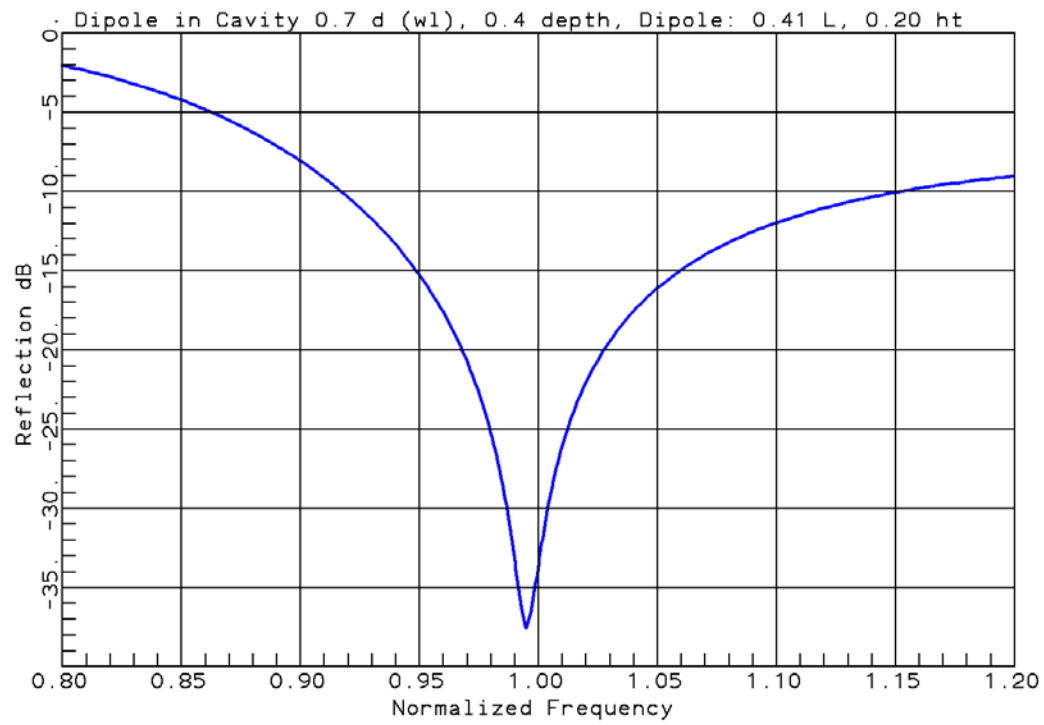
Chapter 5 Dipoles, Slots, and Loops



Cavity: 0.7λ Diameter Aperture, 0.4λ Depth, Dipole: 0.410λ , Height: 0.20λ

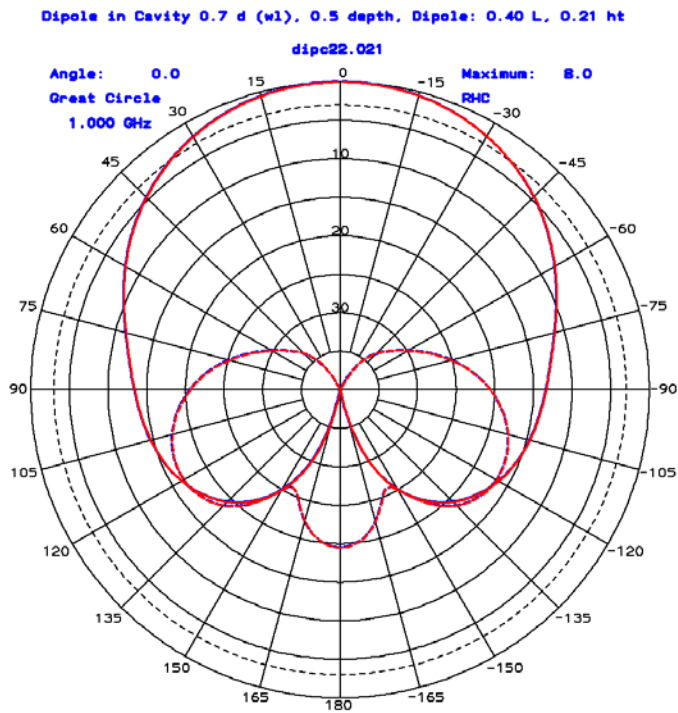
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



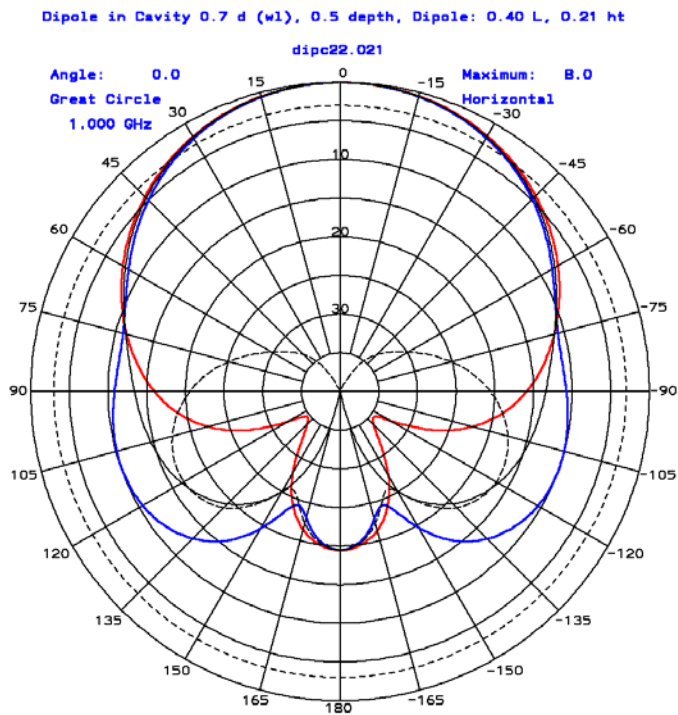


Cavity: 0.7λ Diameter Aperture, 0.5λ Depth, Dipole: 0.40λ , Height: 0.21λ

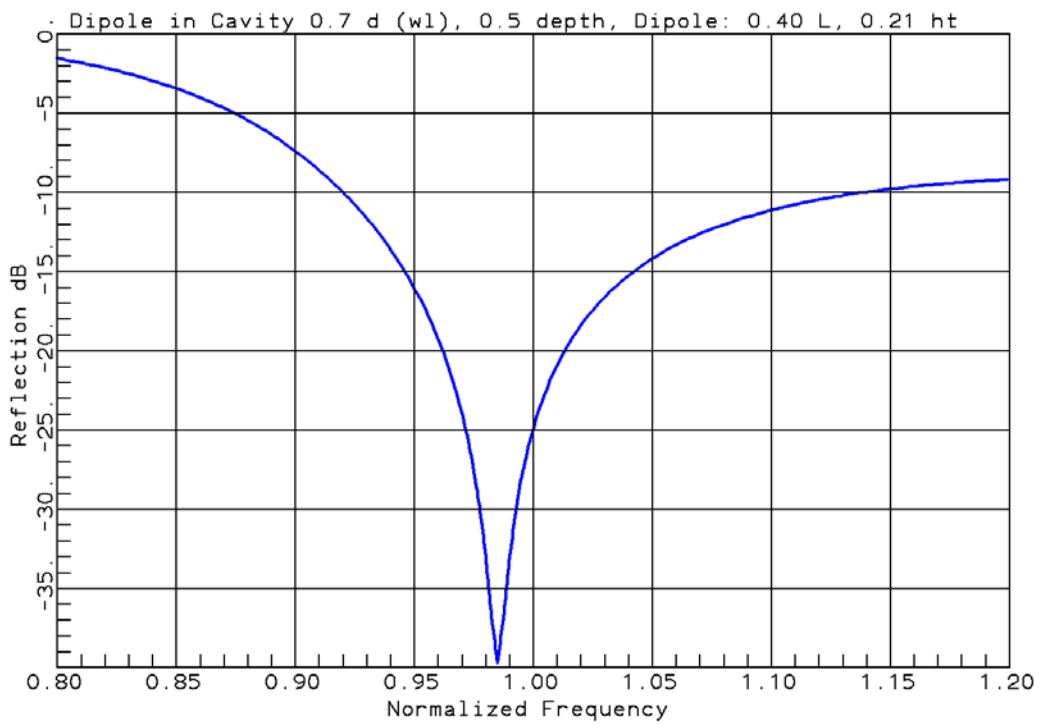
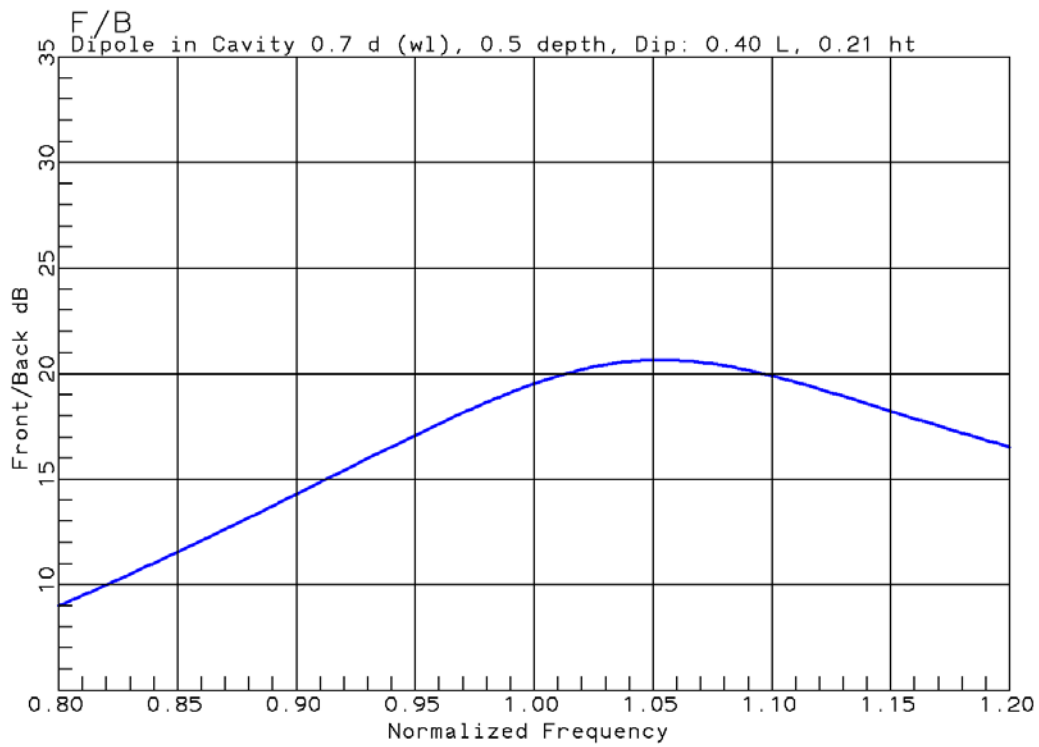
Circular Polarization Blue: $\phi = 0$, Red: $\phi = 45$



Linear Polarization Blue: $\phi = 0$, Red: $\phi = 90$, Black: $\phi = 45$

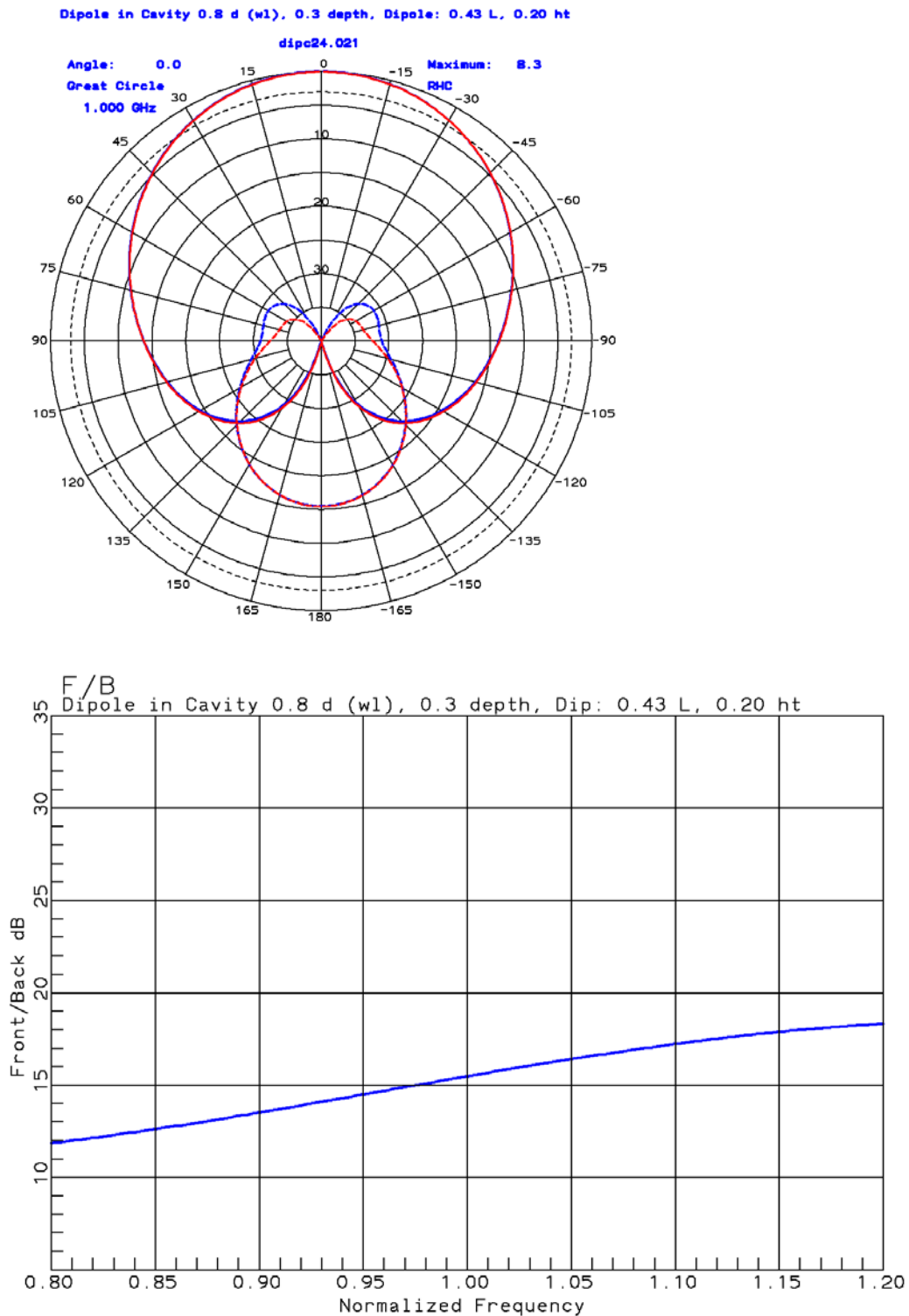


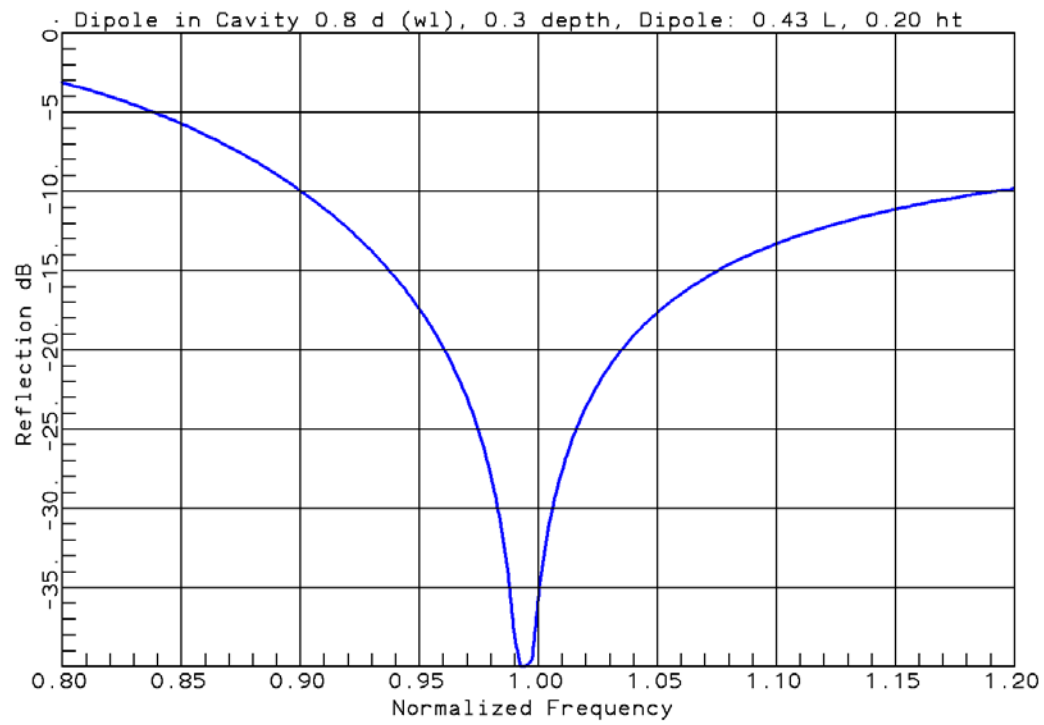
Chapter 5 Dipoles, Slots, and Loops



Cavity: 0.8λ Diameter Aperture, 0.3λ Depth, Dipole: 0.43λ , Height: 0.20λ

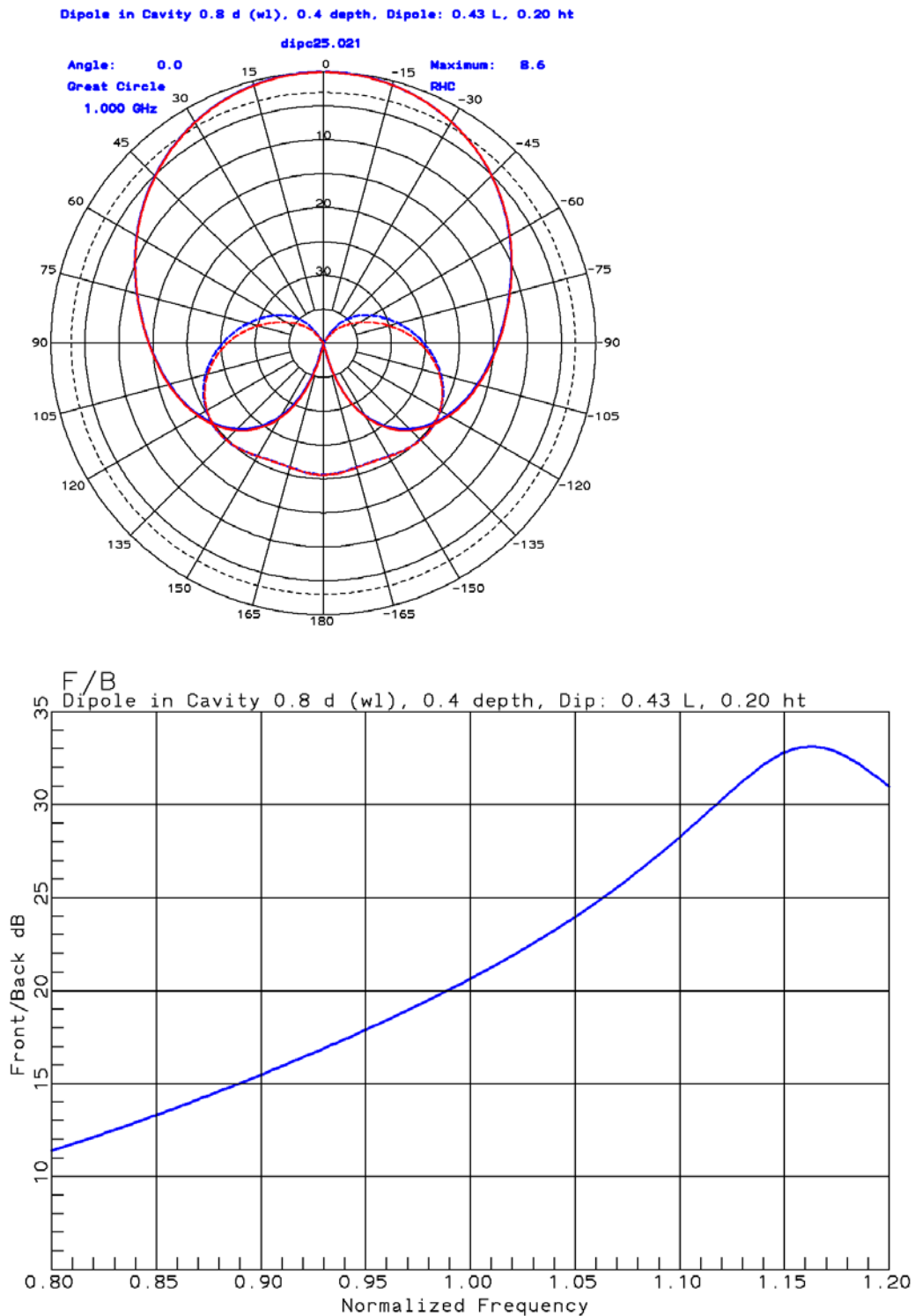
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



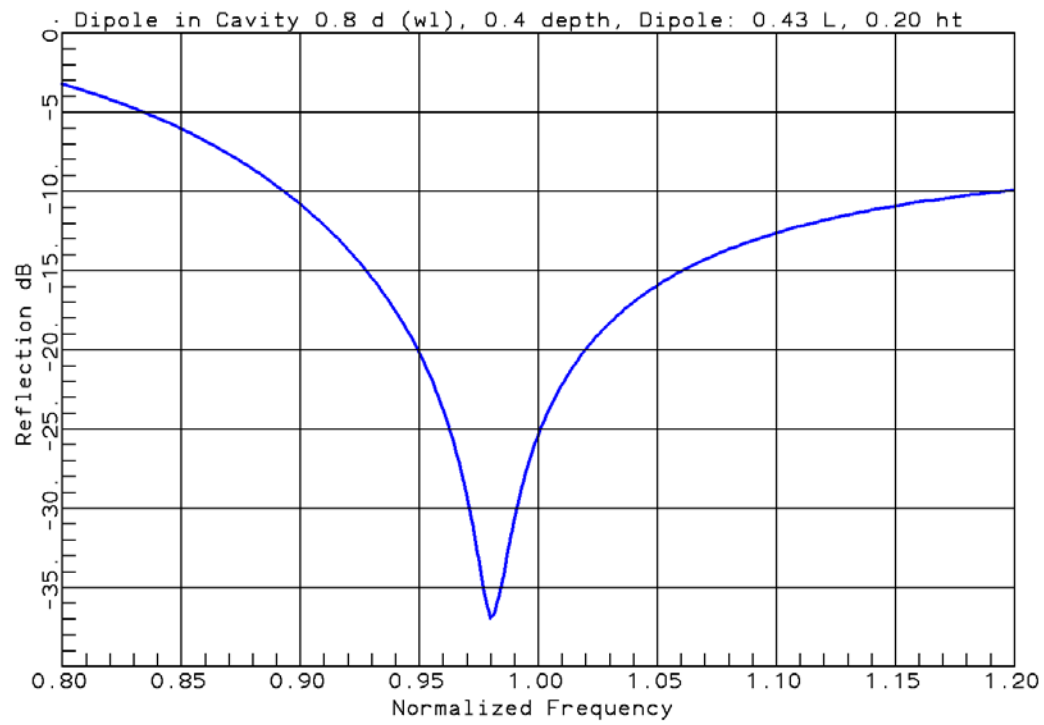


Cavity: 0.8λ Diameter Aperture, 0.4λ Depth, Dipole: 0.43λ , Height: 0.20λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

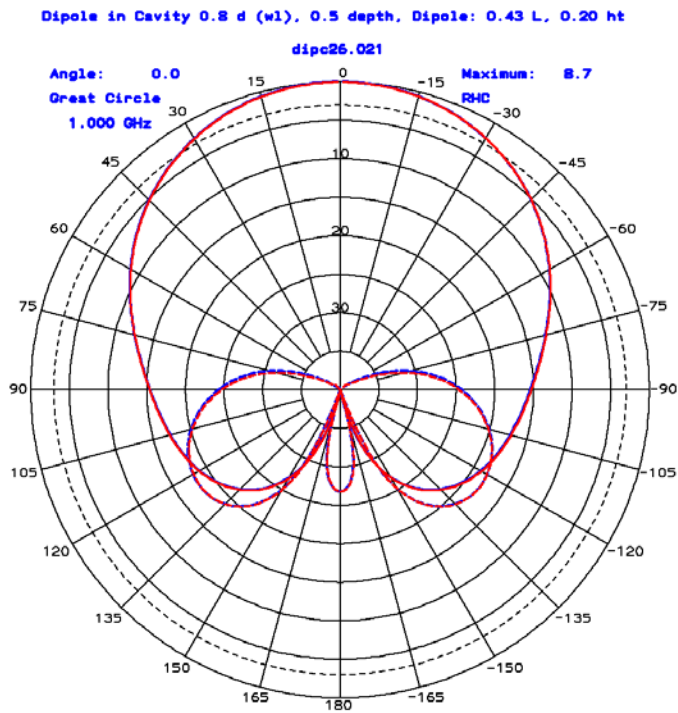


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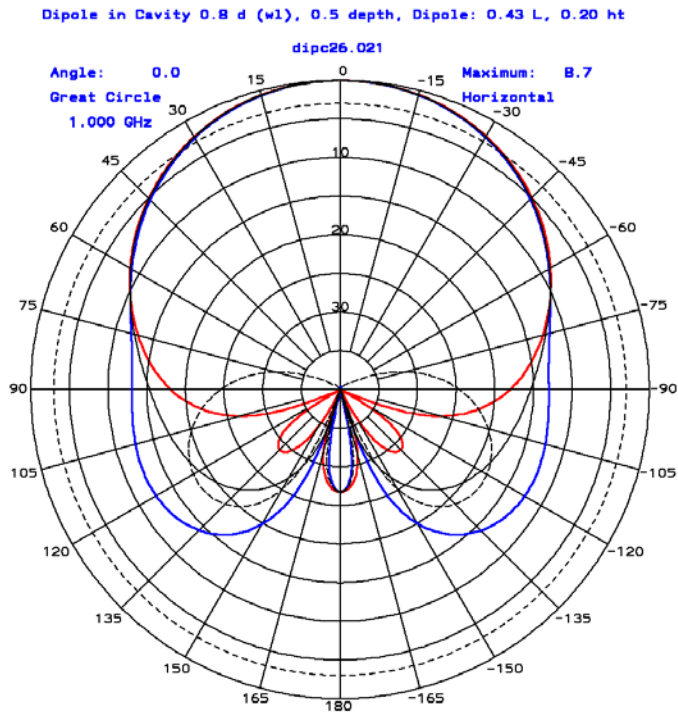


**Cavity: 0.8λ Diameter Aperture, 0.5λ Depth, Dipole: 0.43λ ,
Height: 0.20λ**

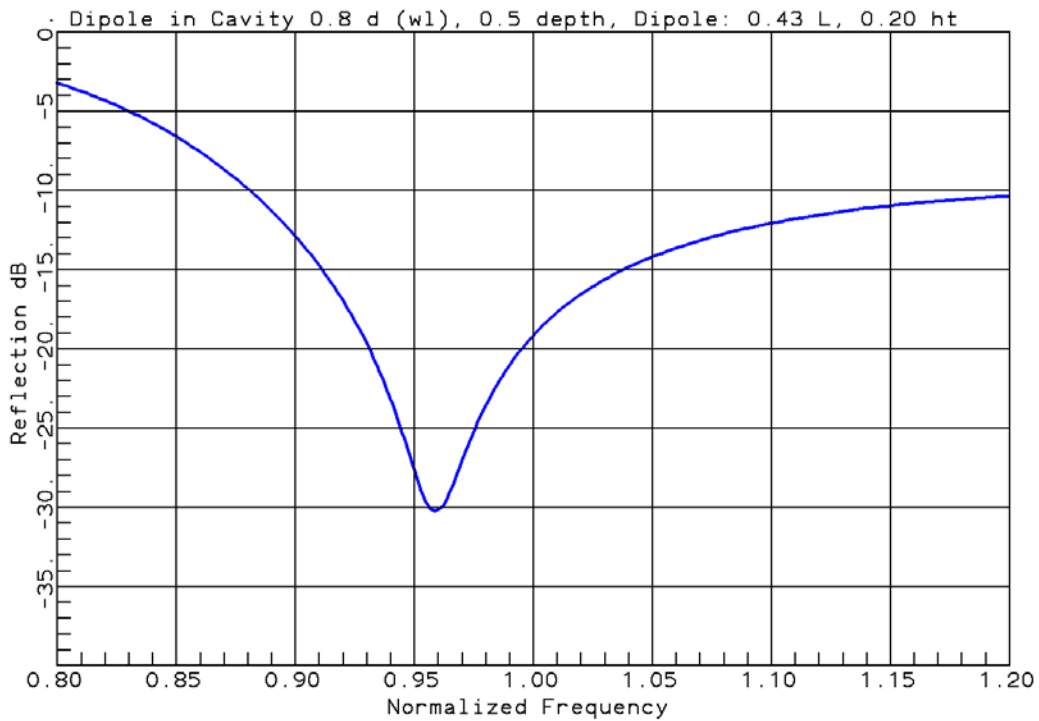
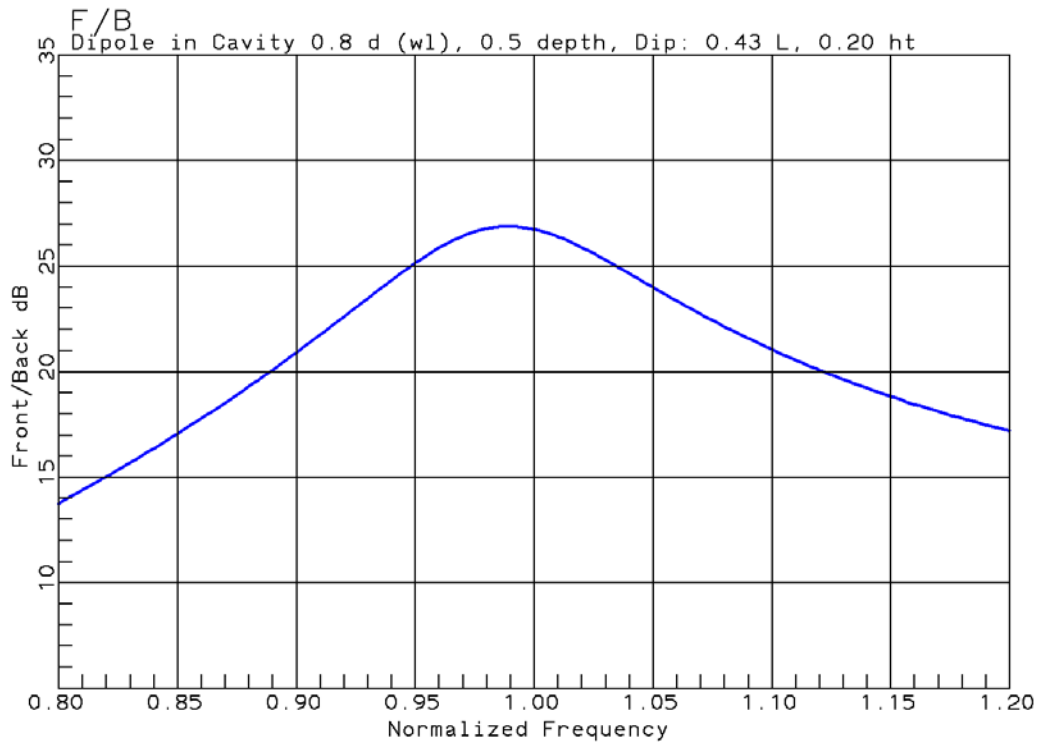
Circular Polarization Blue: $\phi = 0$, Red: $\phi = 45$



Linear Polarization Blue: $\phi = 0$, Red: $\phi = 90$, Black: $\phi = 45$

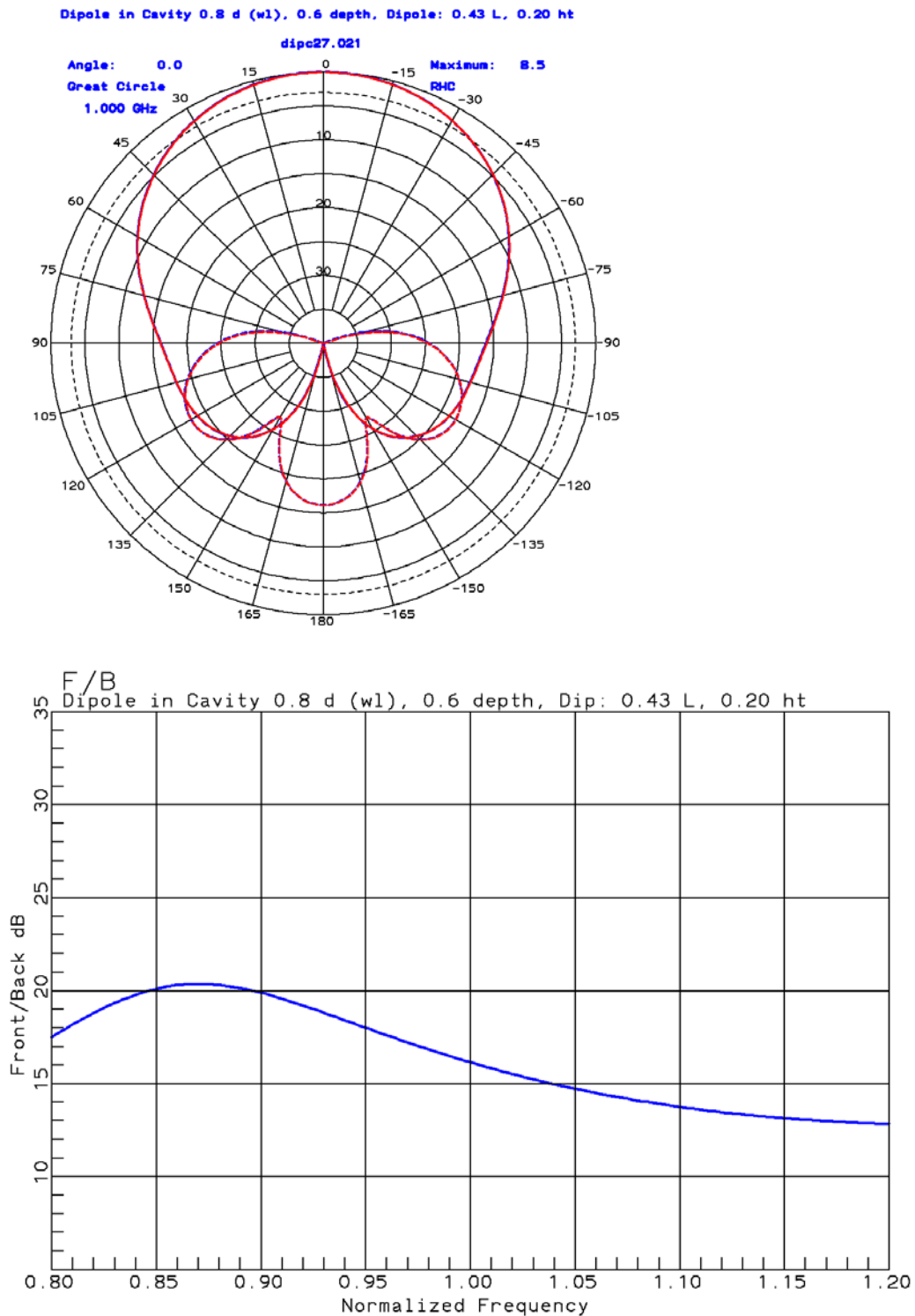


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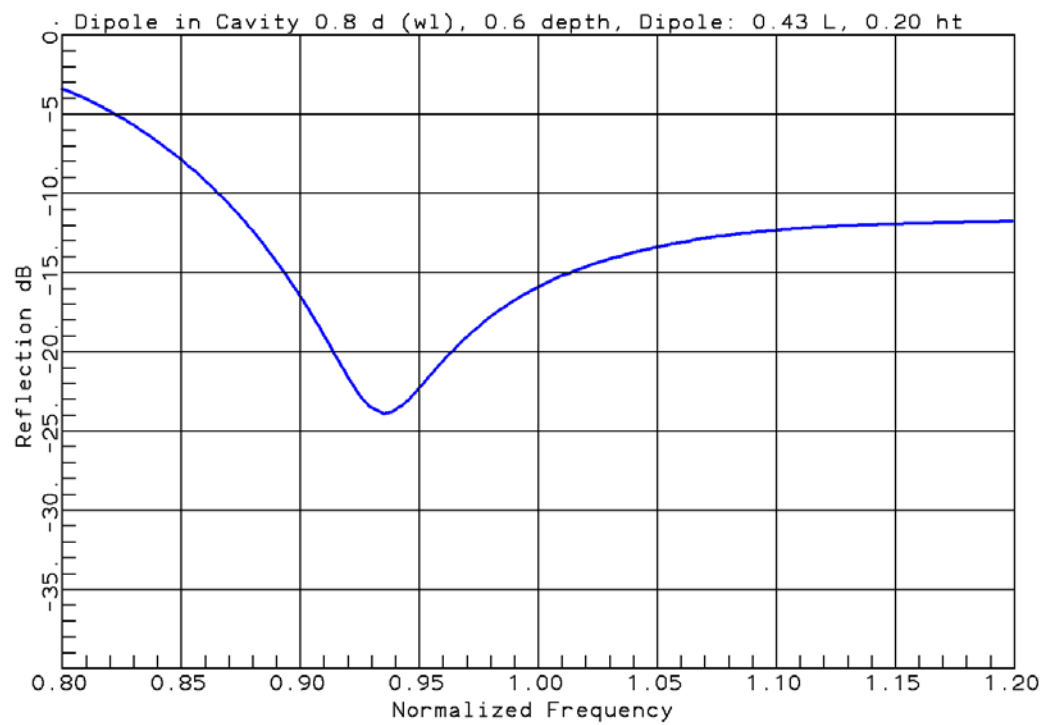


Cavity: 0.8λ Diameter Aperture, 0.6λ Depth, Dipole: 0.43λ , Height: 0.20λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

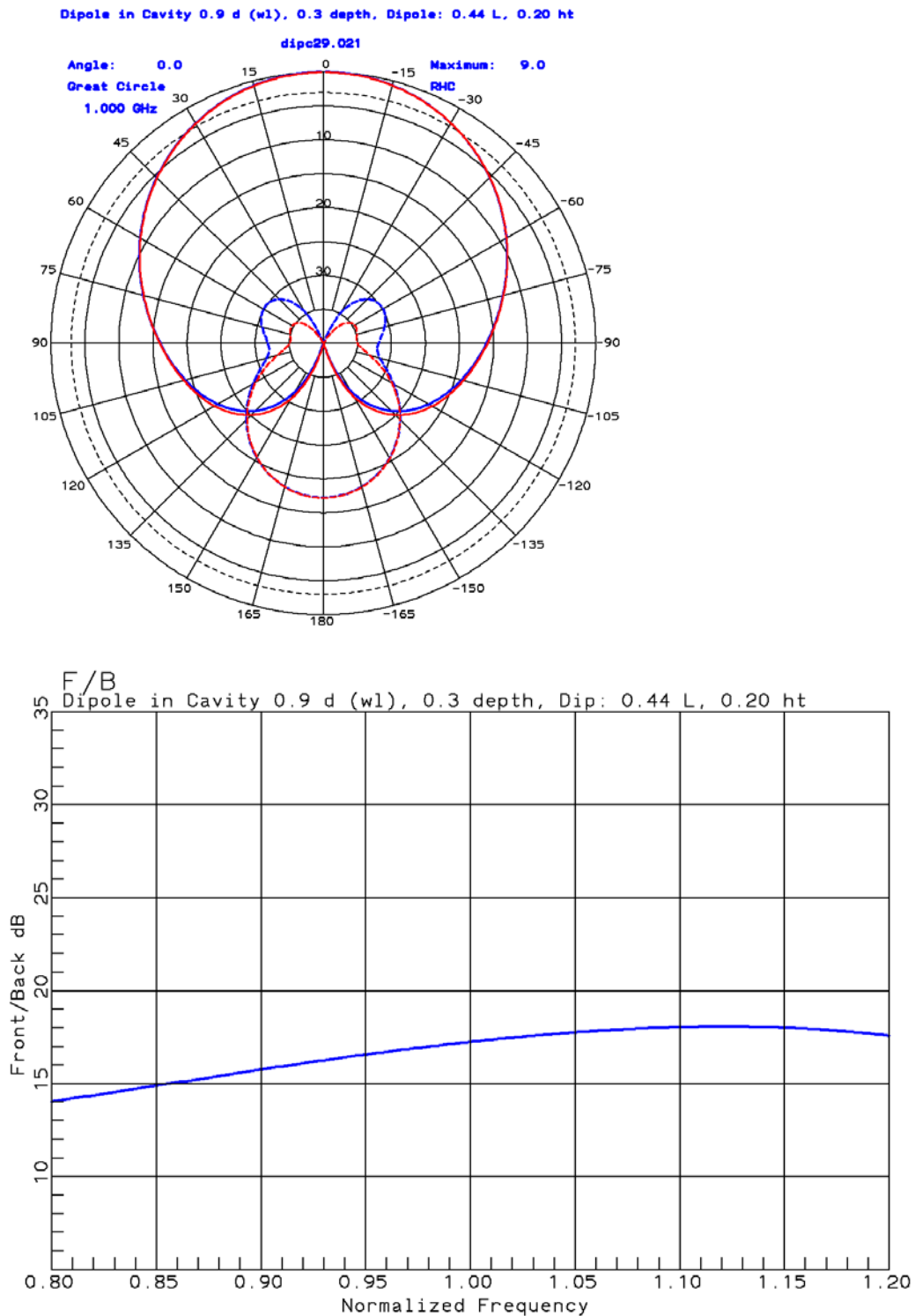


Chapter 5 Dipoles, Slots, and Loops

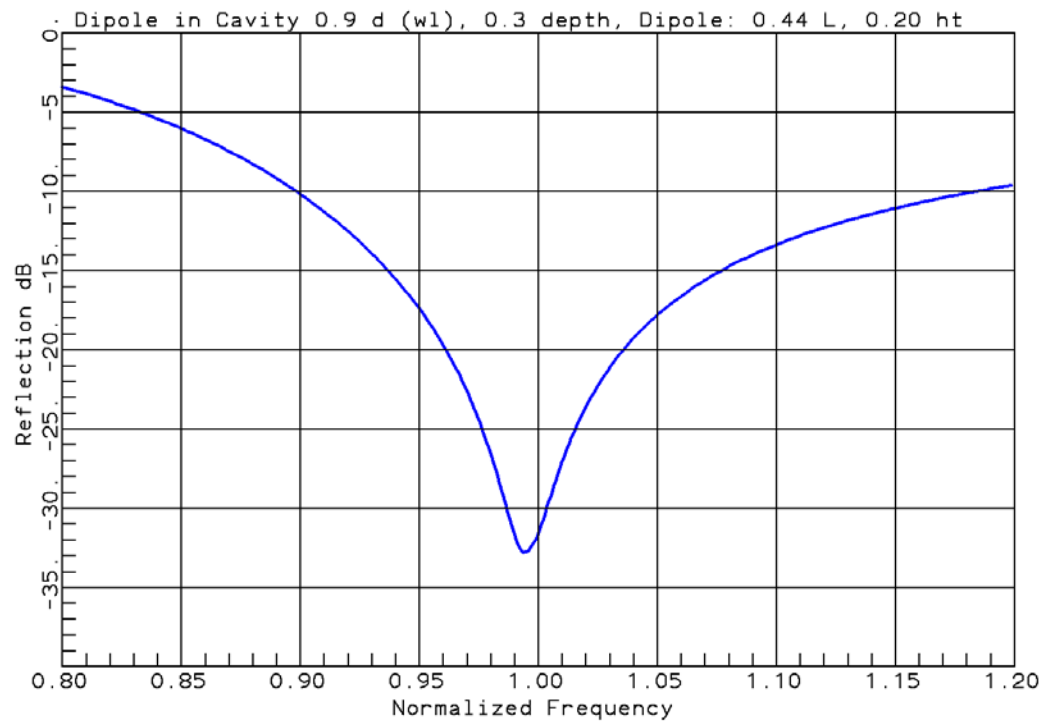


Cavity: 0.9λ Diameter Aperture, 0.3λ Depth, Dipole: 0.44λ , Height: 0.20λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

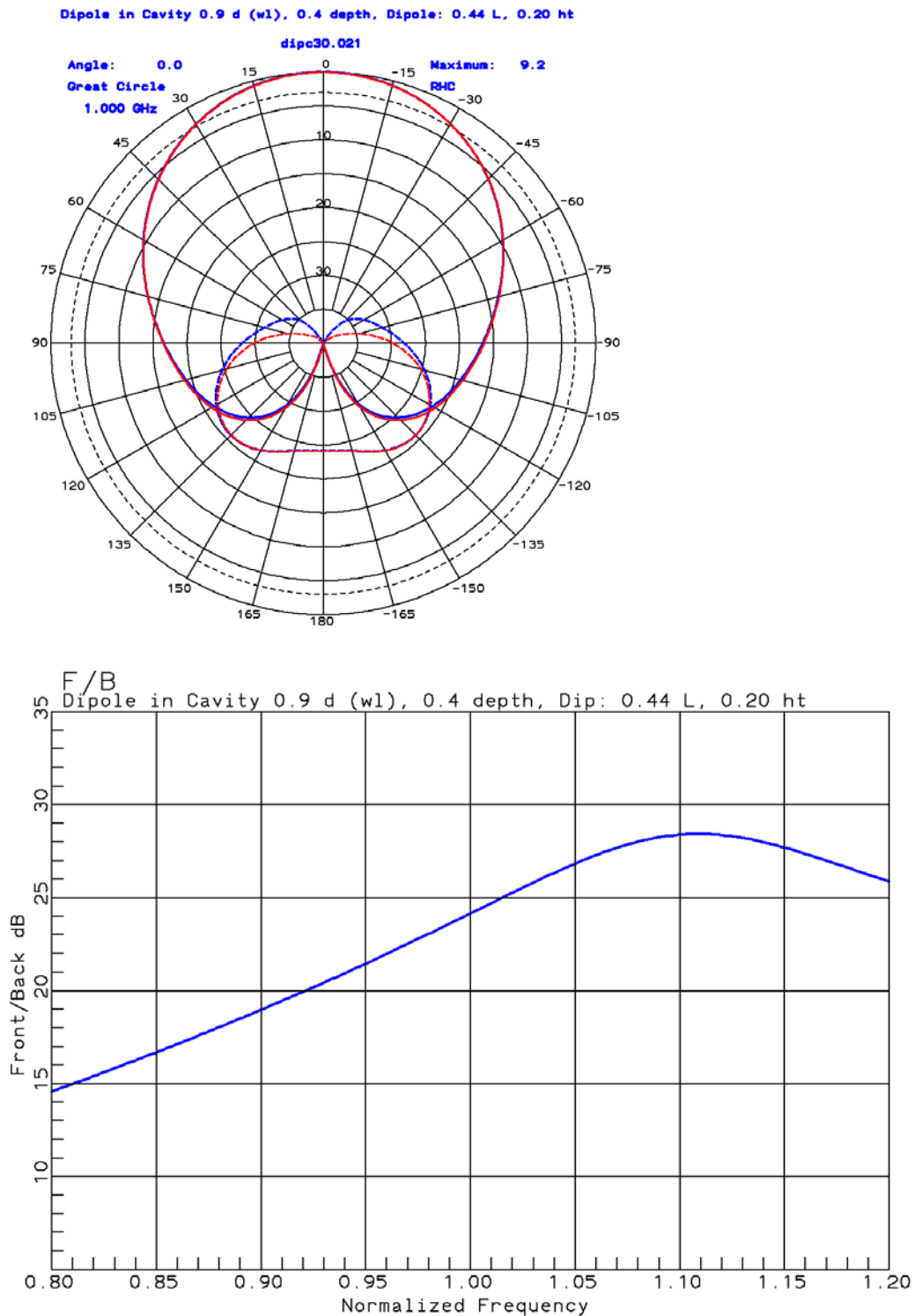


Chapter 5 Dipoles, Slots, and Loops

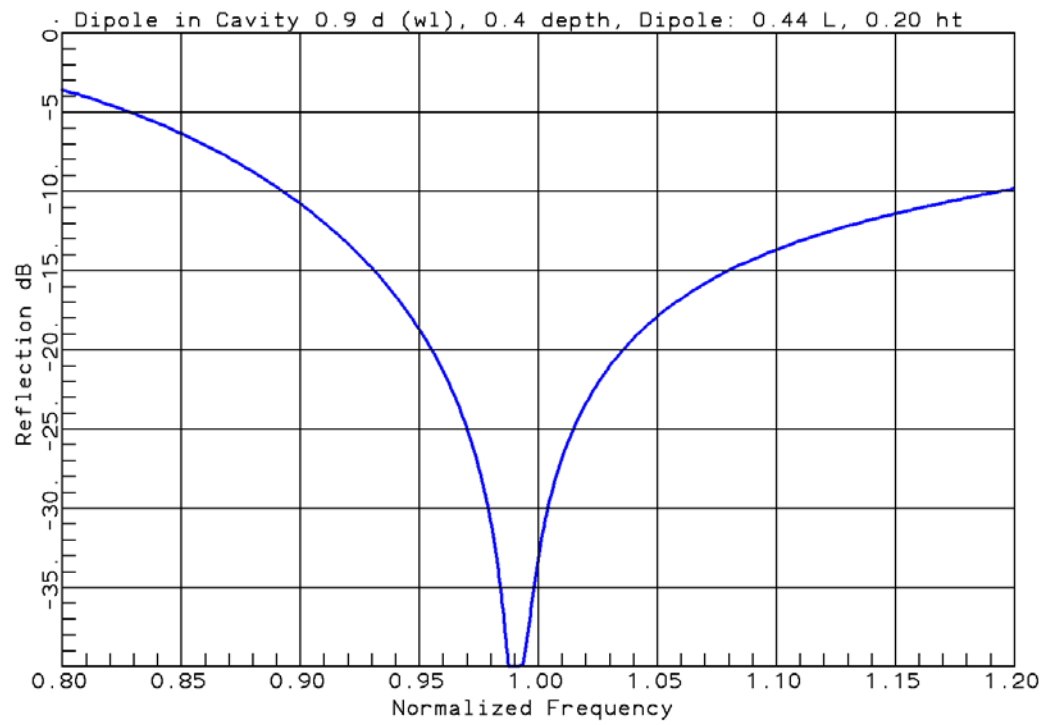


Cavity: 0.9λ Diameter Aperture, 0.4λ Depth, Dipole: 0.44λ , Height: 0.20λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

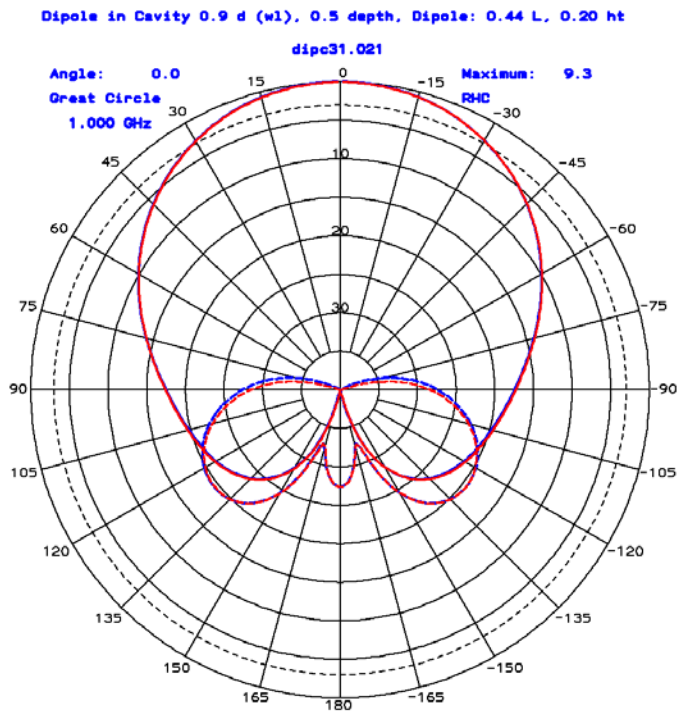


Chapter 5 Dipoles, Slots, and Loops

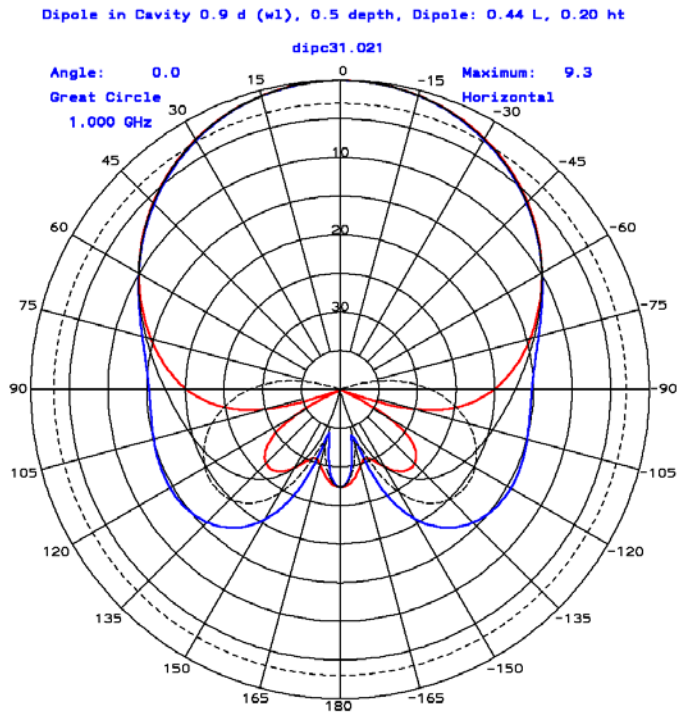


**Cavity: 0.9λ Diameter Aperture, 0.5λ Depth, Dipole: 0.44λ ,
Height: 0.20λ**

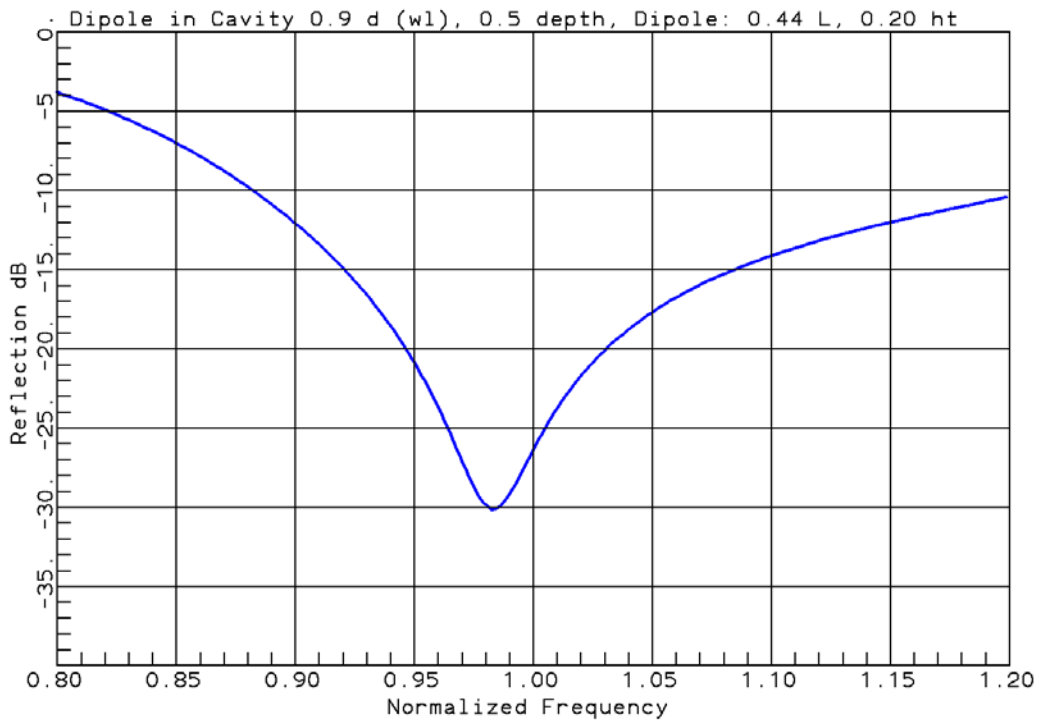
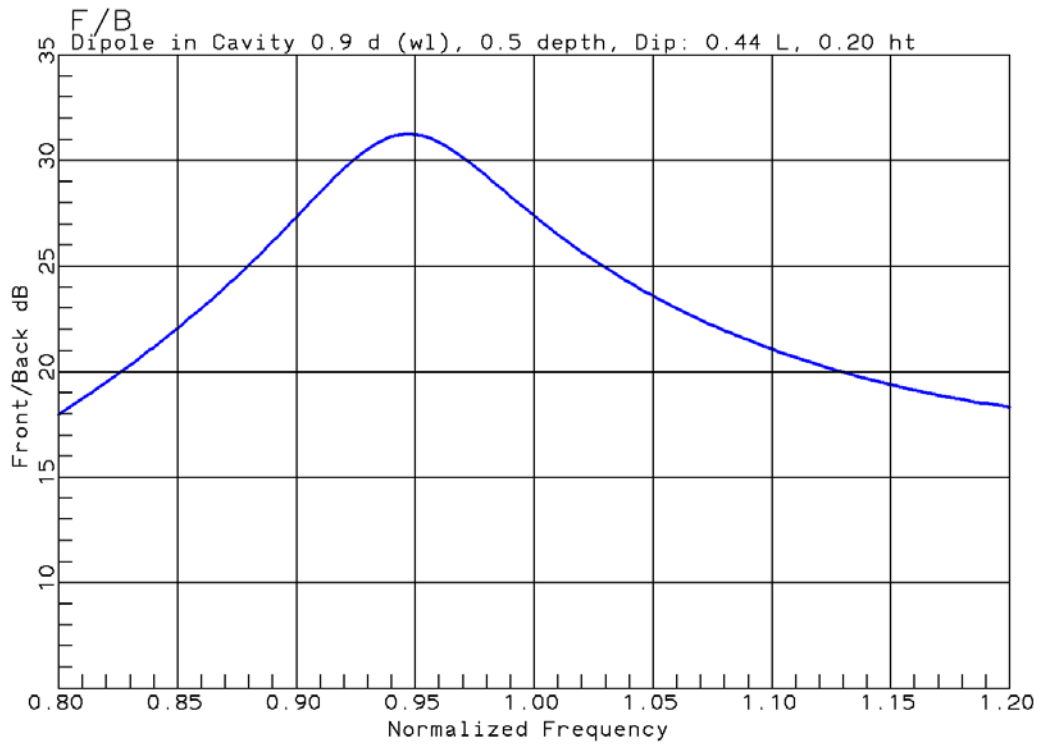
Circular Polarization Blue: $\phi = 0$, Red: $\phi = 45$



Linear Polarization Blue: $\phi = 0$, Red: $\phi = 90$, Black: $\phi = 45$

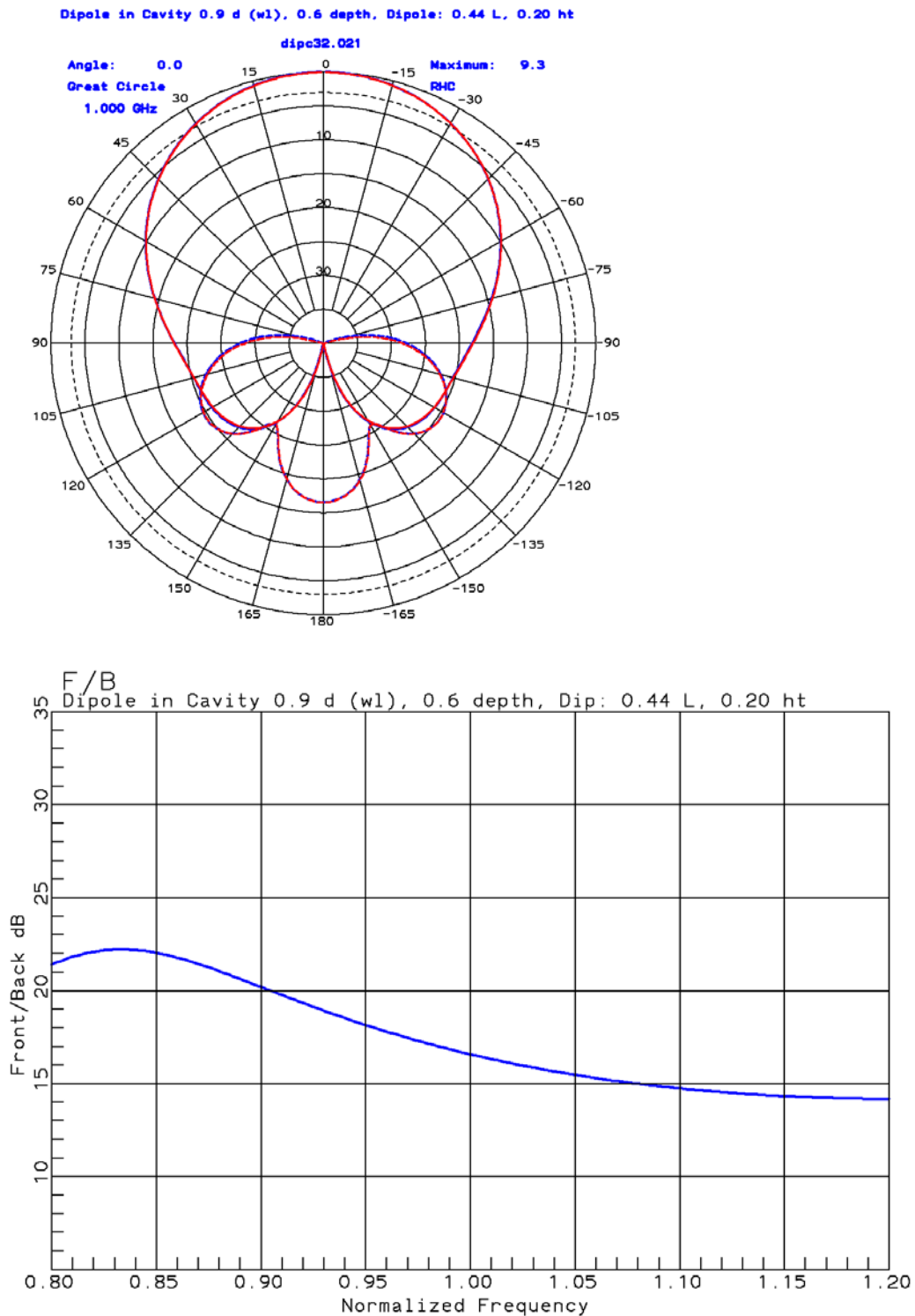


Chapter 5 Dipoles, Slots, and Loops

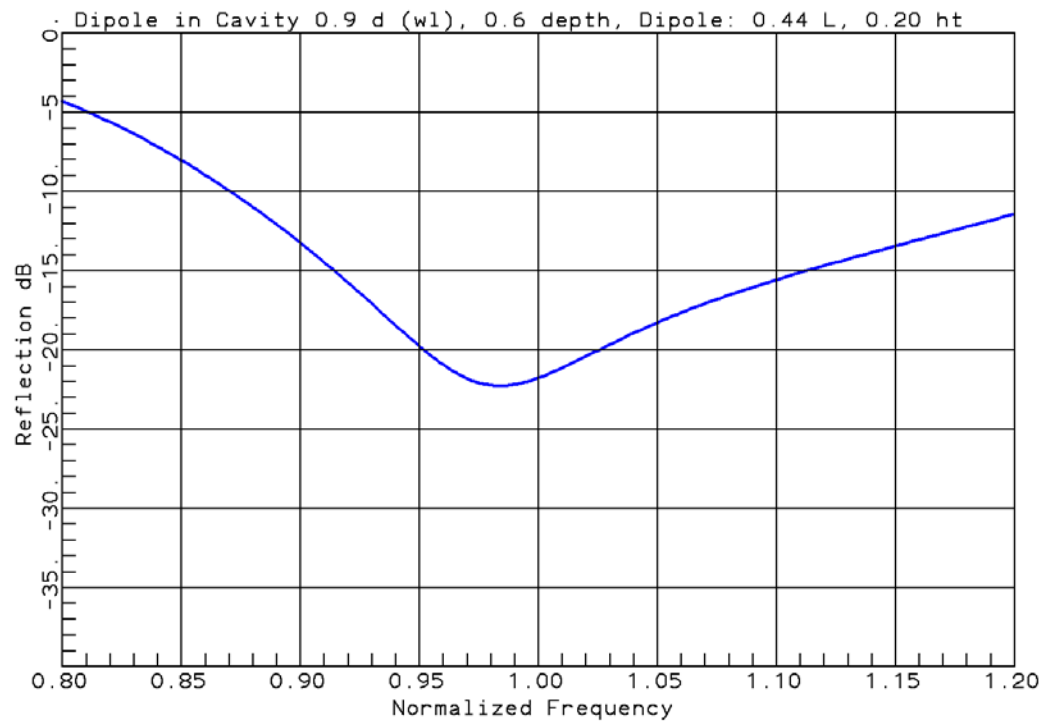


Cavity: 0.9λ Diameter Aperture, 0.6λ Depth, Dipole: 0.44λ , Height: 0.20λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

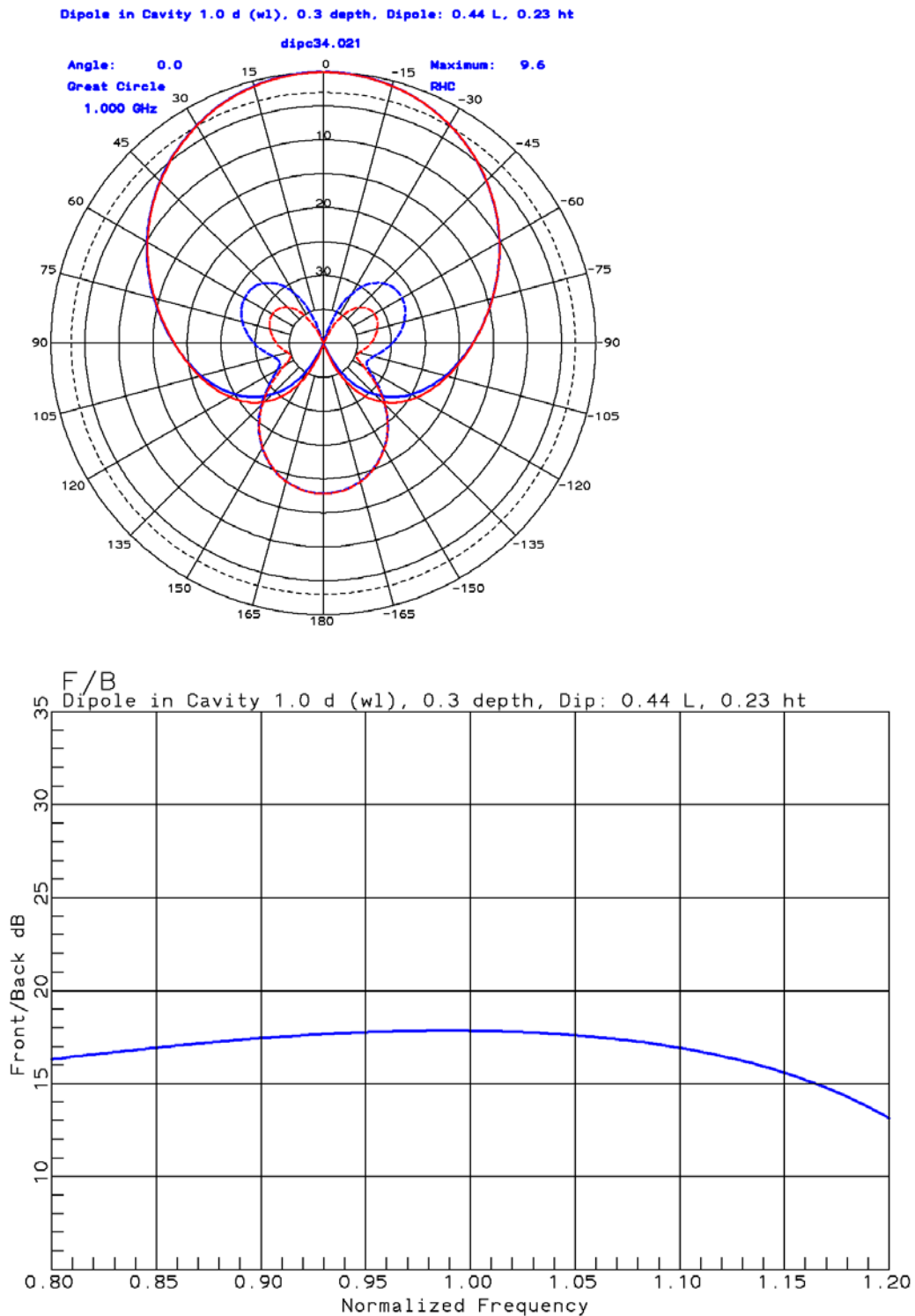


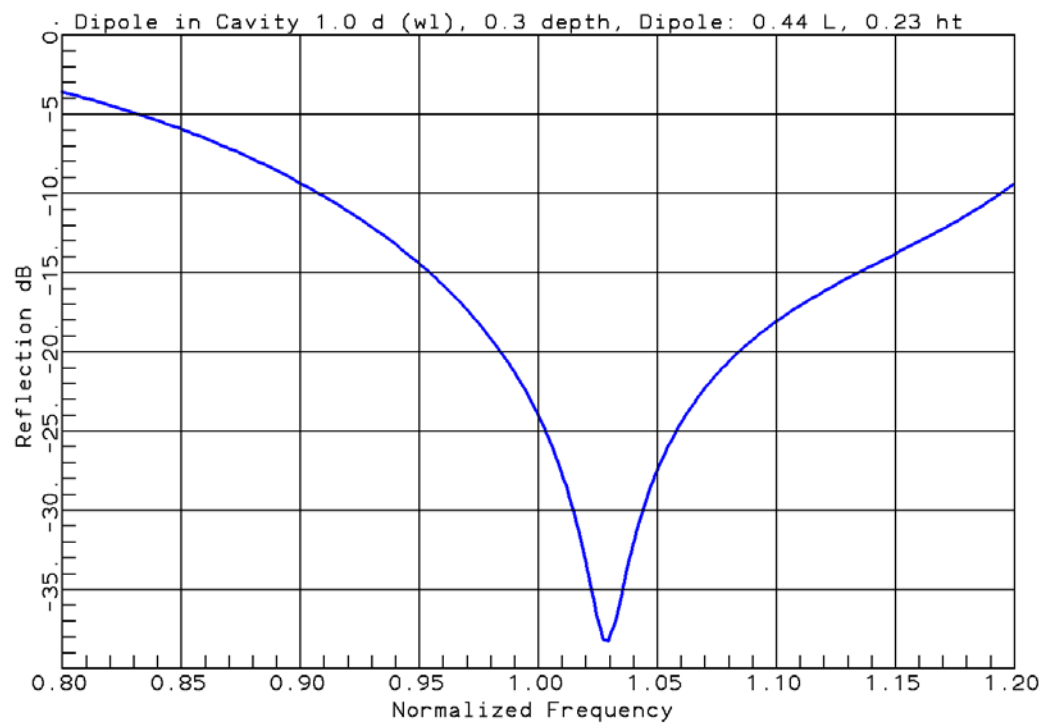
Chapter 5 Dipoles, Slots, and Loops



Cavity: 1.0λ Diameter Aperture, 0.3λ Depth, Dipole: 0.44λ , Height: 0.23λ

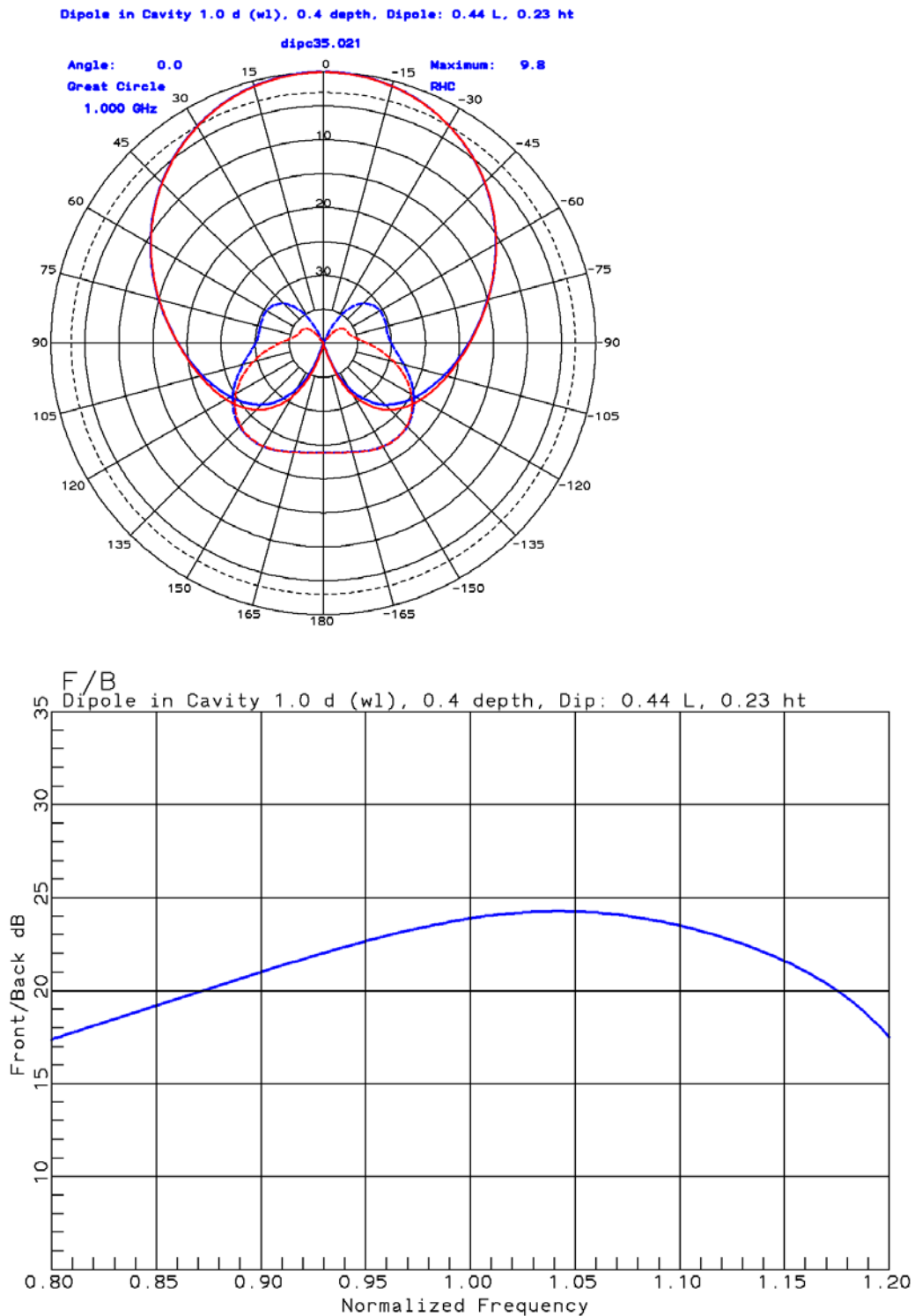
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

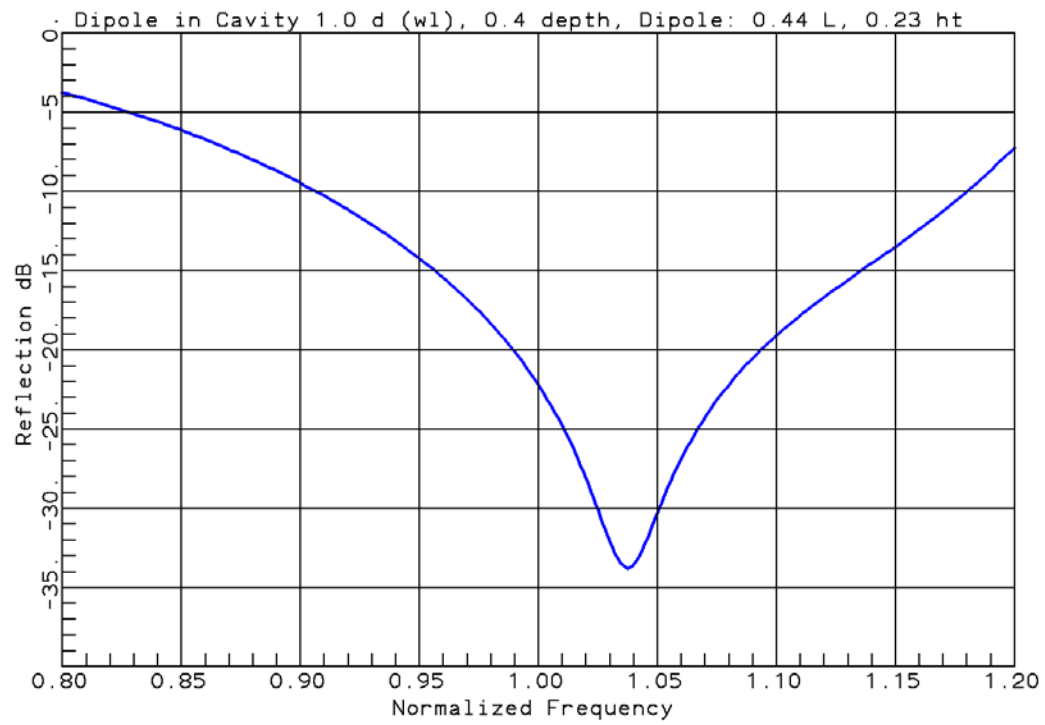




Cavity: 1.0λ Diameter Aperture, 0.4λ Depth, Dipole: 0.44λ , Height: 0.23λ

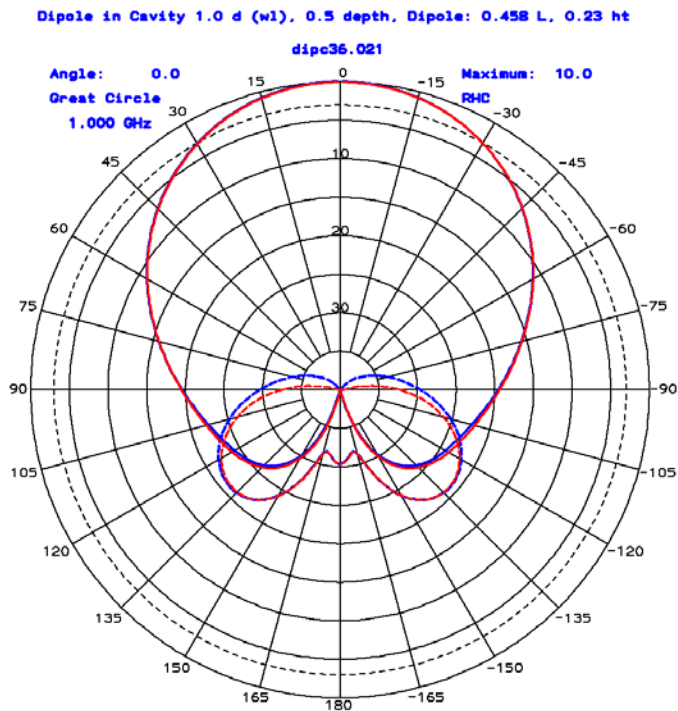
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



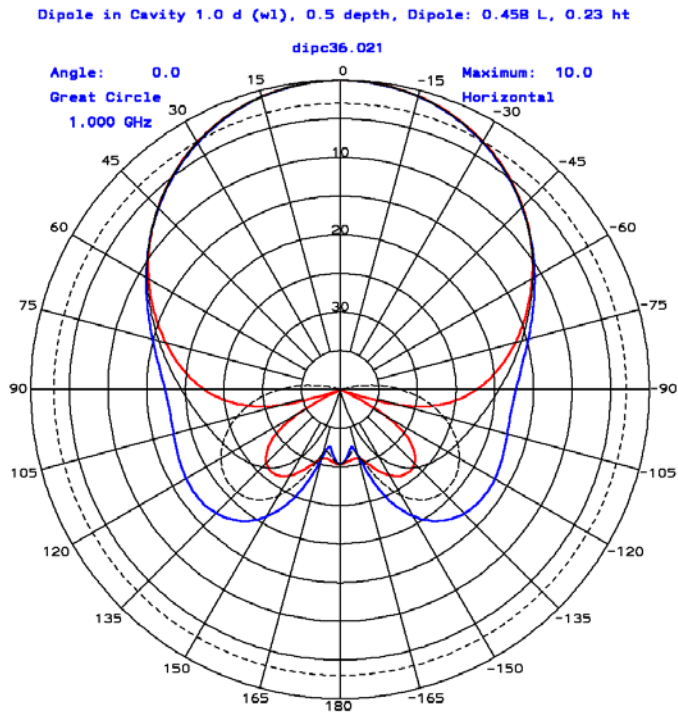


Cavity: 1.0λ Diameter Aperture, 0.5λ Depth, Dipole: 0.458λ , Height: 0.23λ

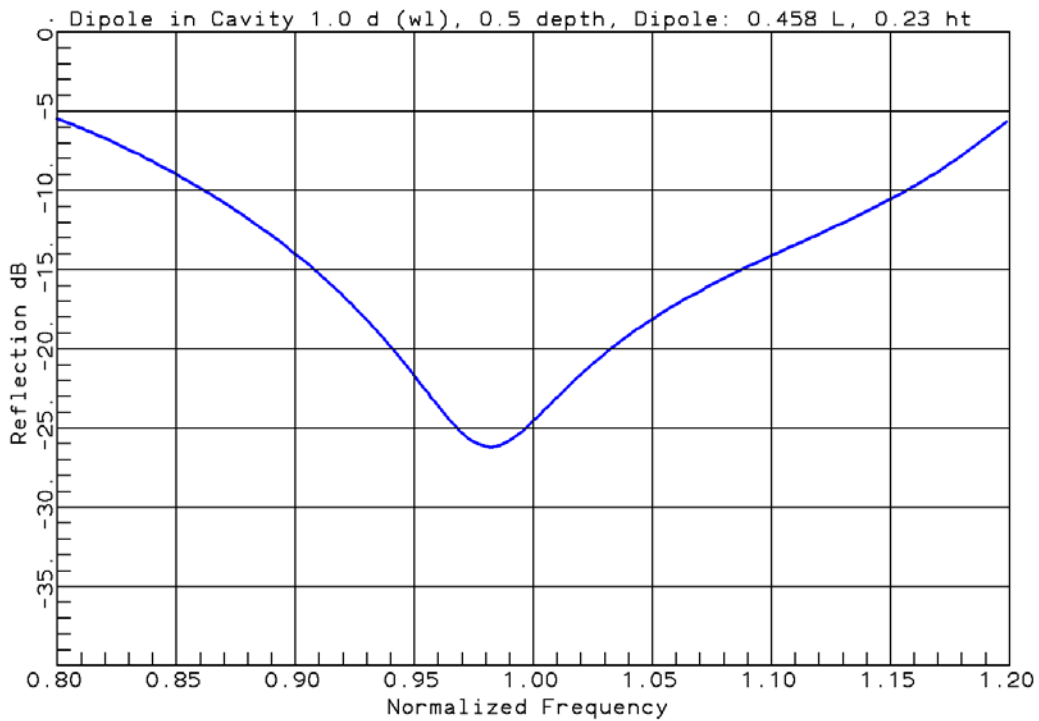
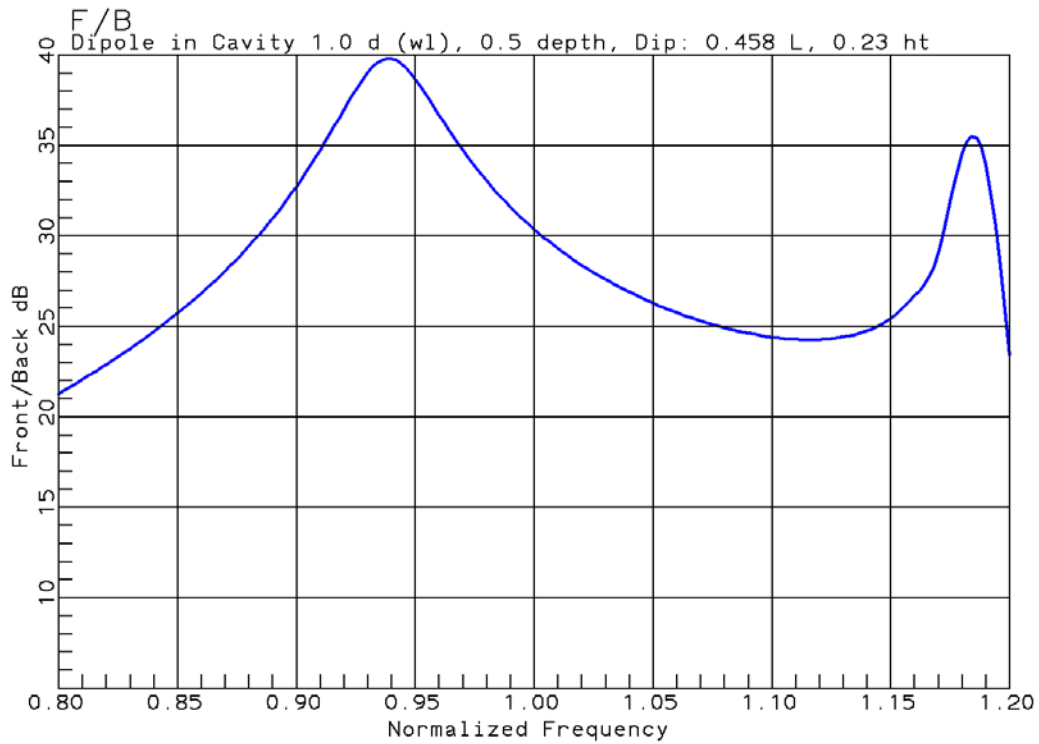
Circular Polarization Blue: $\phi = 0$, Red: $\phi = 45$



Linear Polarization Blue: $\phi = 0$, Red: $\phi = 90$, Black: $\phi = 45$

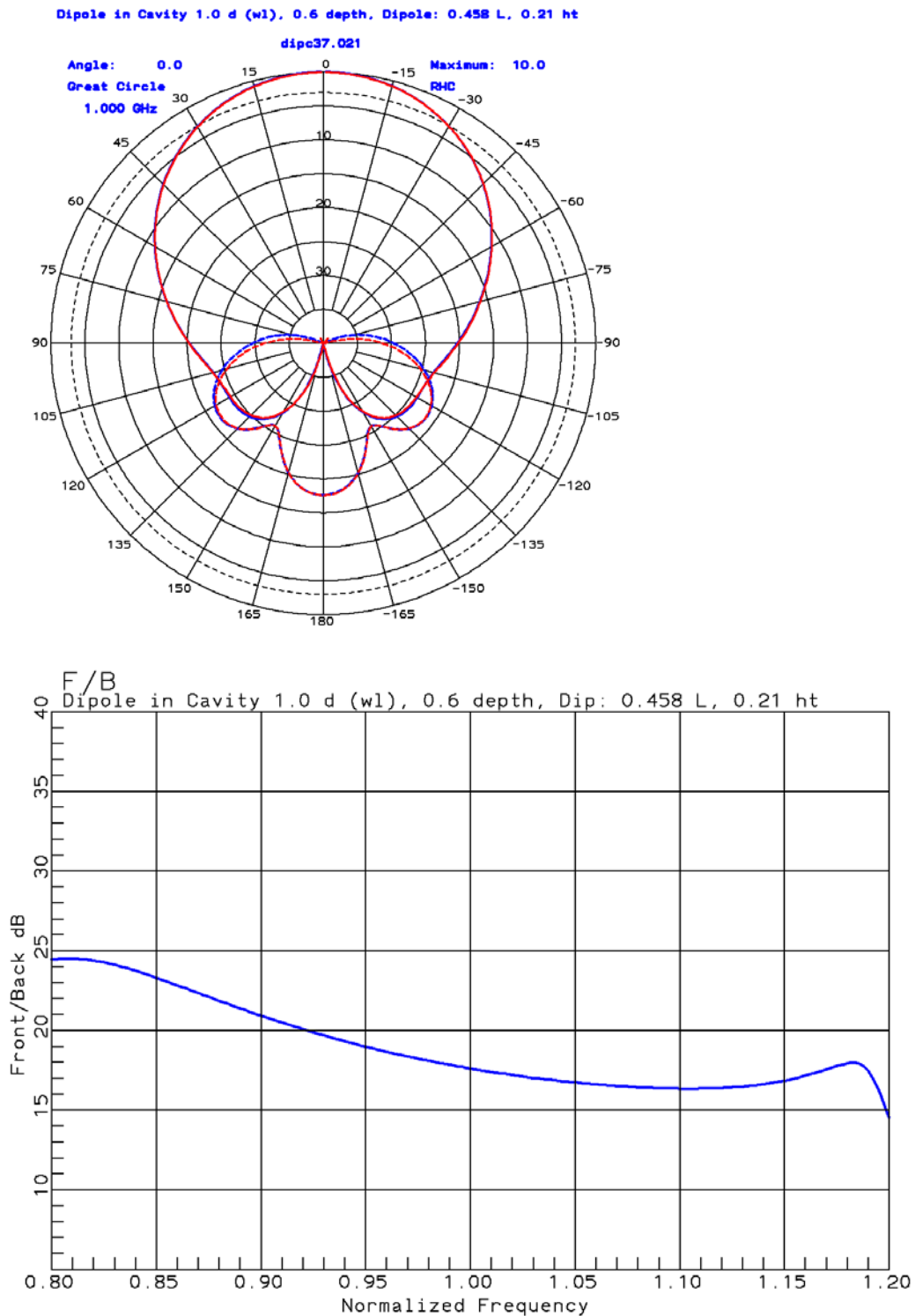


Chapter 5 Dipoles, Slots, and Loops

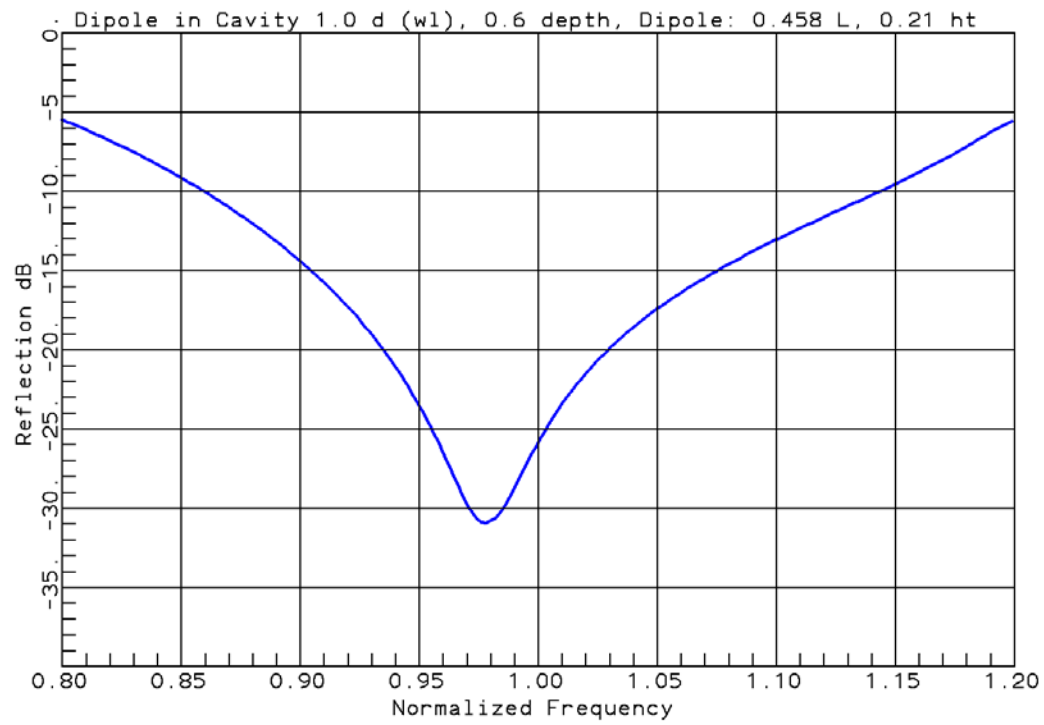


Cavity: 1.0λ Diameter Aperture, 0.6λ Depth, Dipole: 0.458λ , Height: 0.21λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

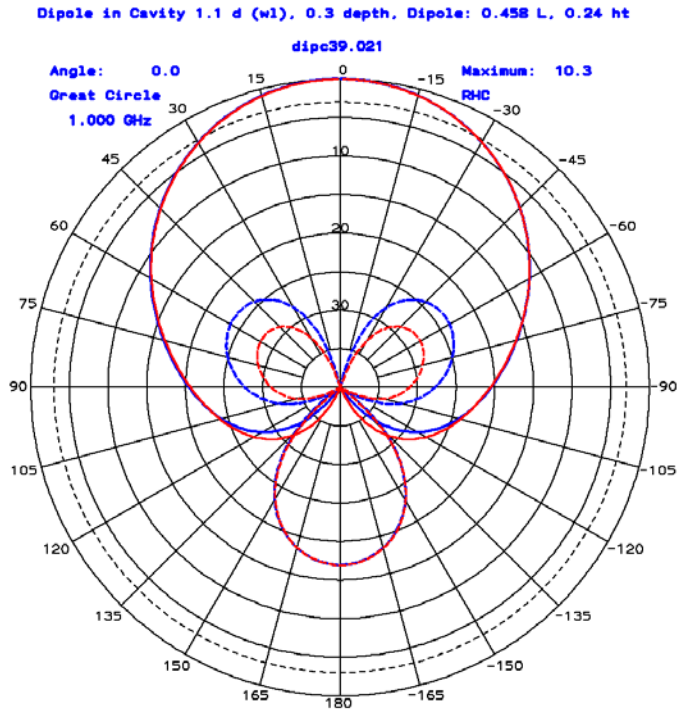


Chapter 5 Dipoles, Slots, and Loops

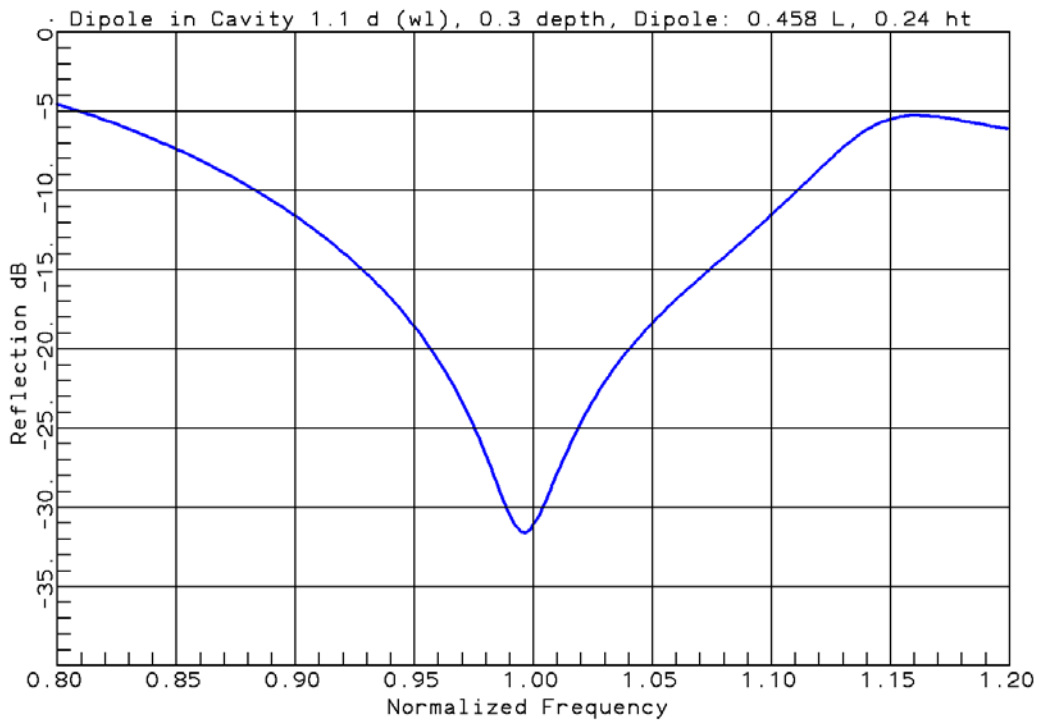
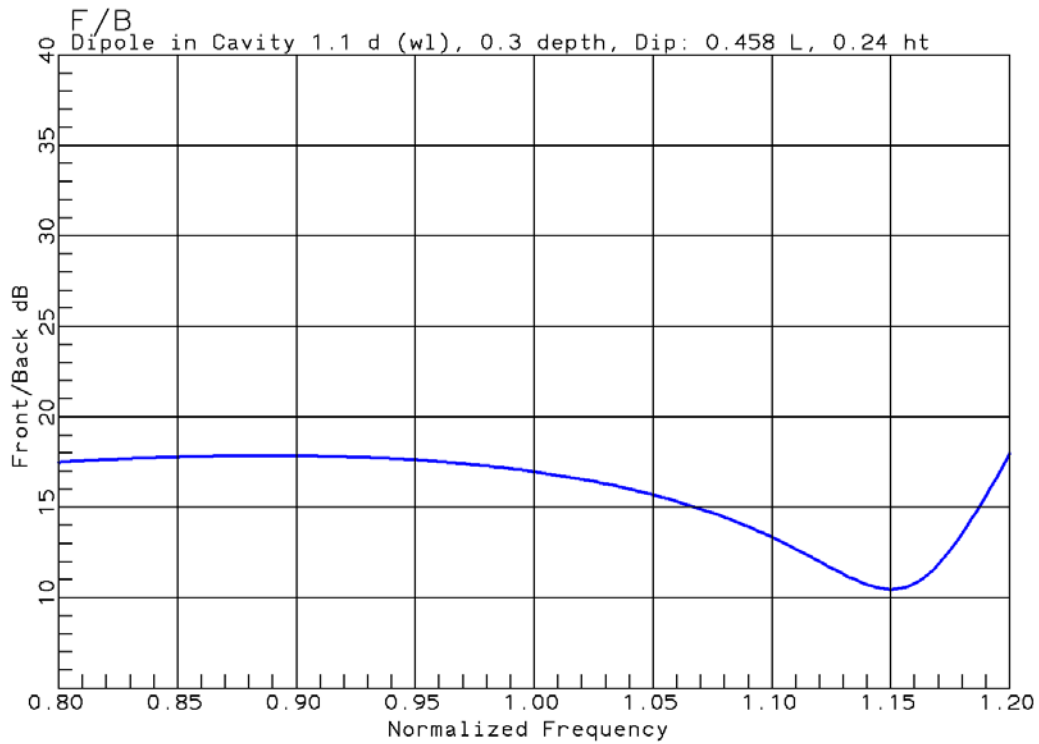


**Cavity: 1.1λ Diameter Aperture, 0.3λ Depth, Dipole: 0.458λ ,
Height: 0.24λ**

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

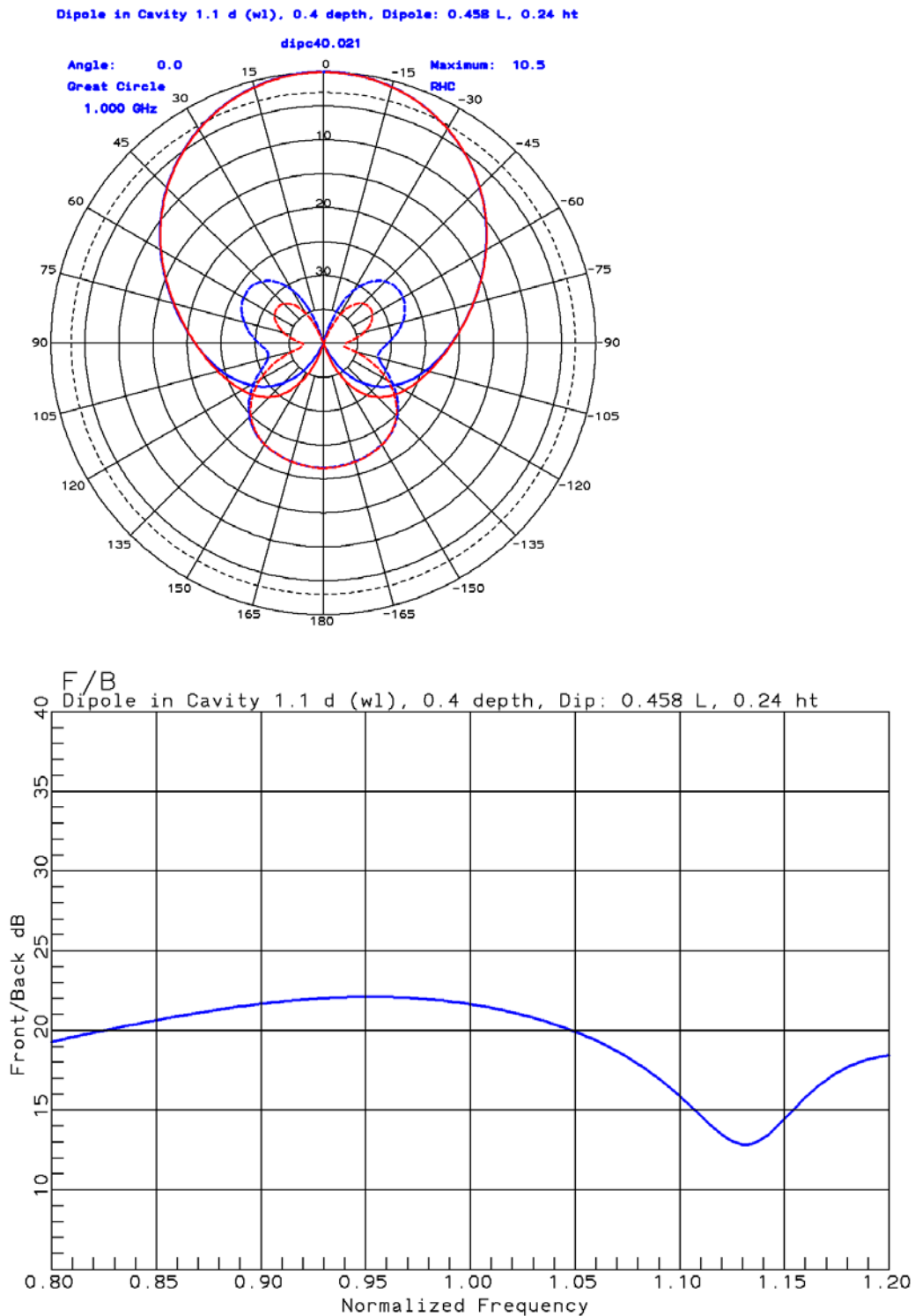


Chapter 5 Dipoles, Slots, and Loops

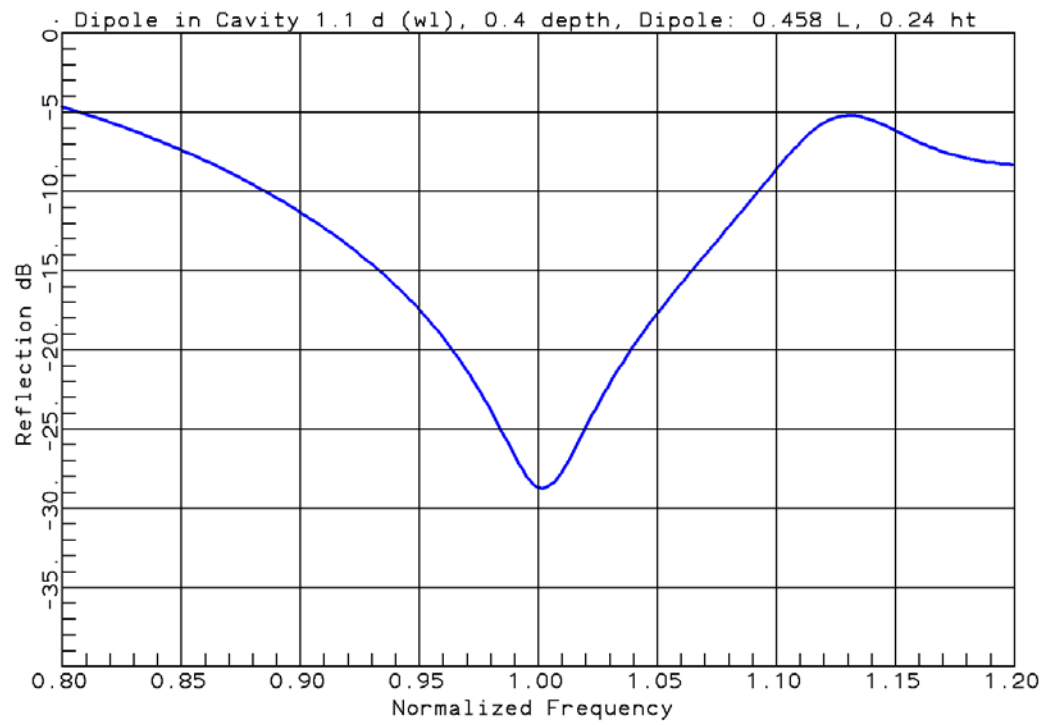


Cavity: 1.1λ Diameter Aperture, 0.4λ Depth, Dipole: 0.458λ , Height: 0.24λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

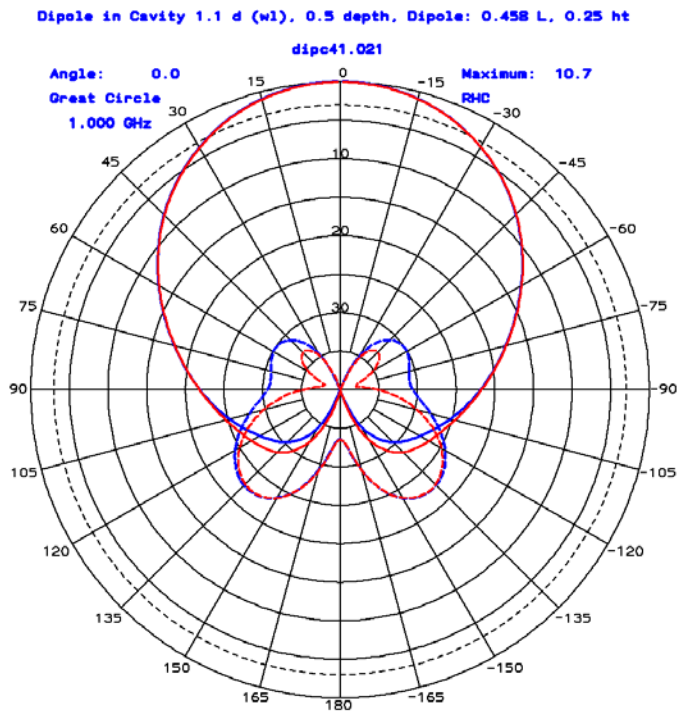


Chapter 5 Dipoles, Slots, and Loops

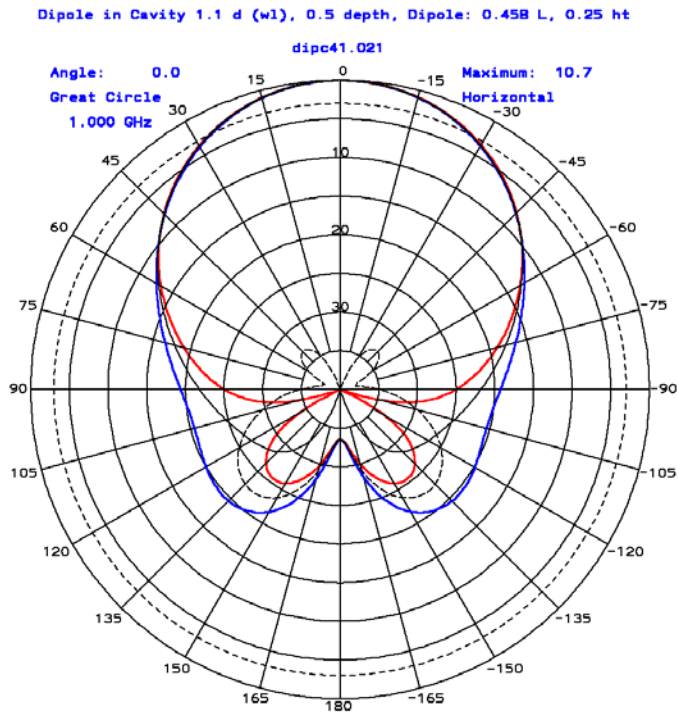


Cavity: 1.1λ Diameter Aperture, 0.5λ Depth, Dipole: 0.458λ , Height: 0.25λ

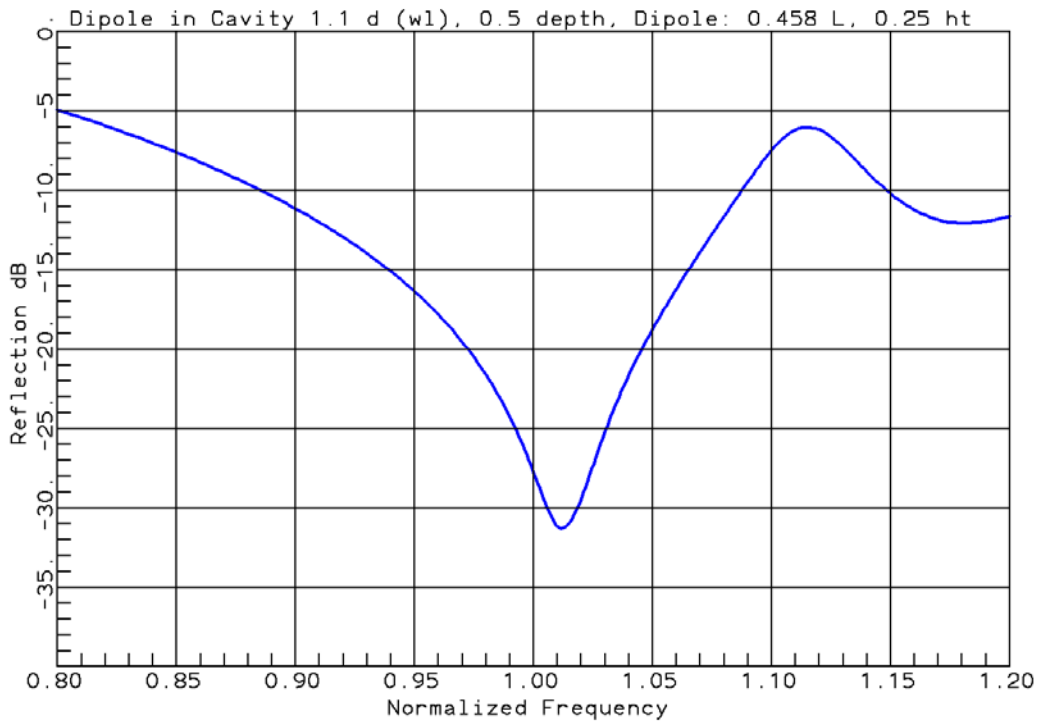
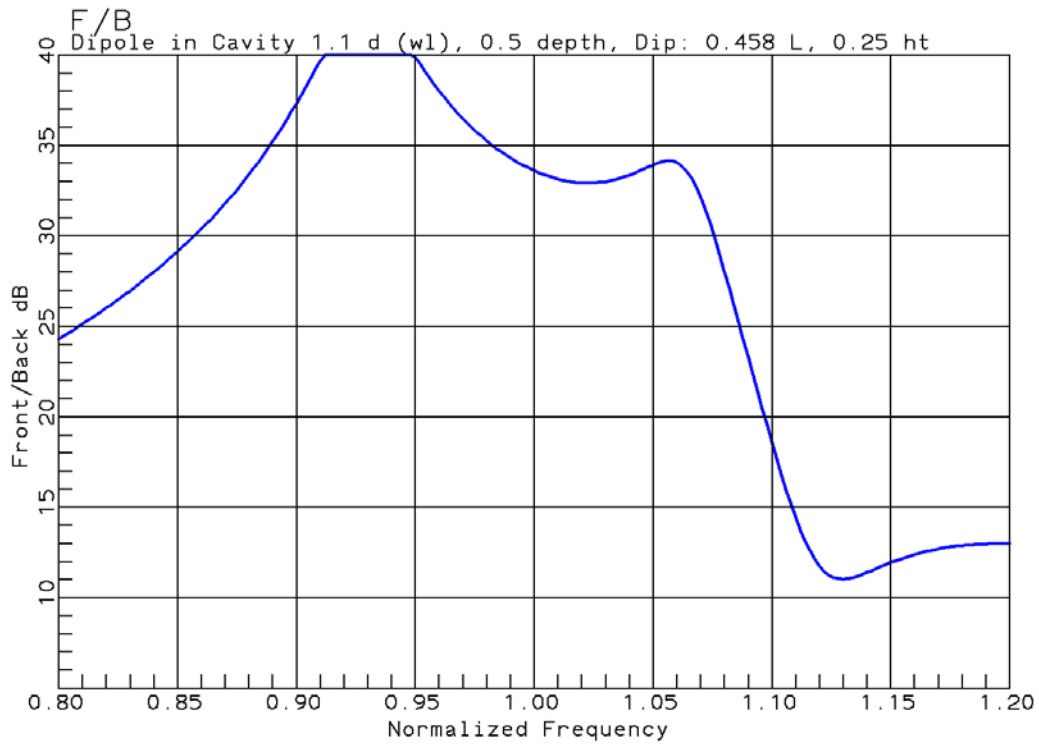
Circular Polarization Blue: $\phi = 0$, Red: $\phi = 45$



Linear Polarization Blue: $\phi = 0$, Red: $\phi = 90$, Black: $\phi = 45$

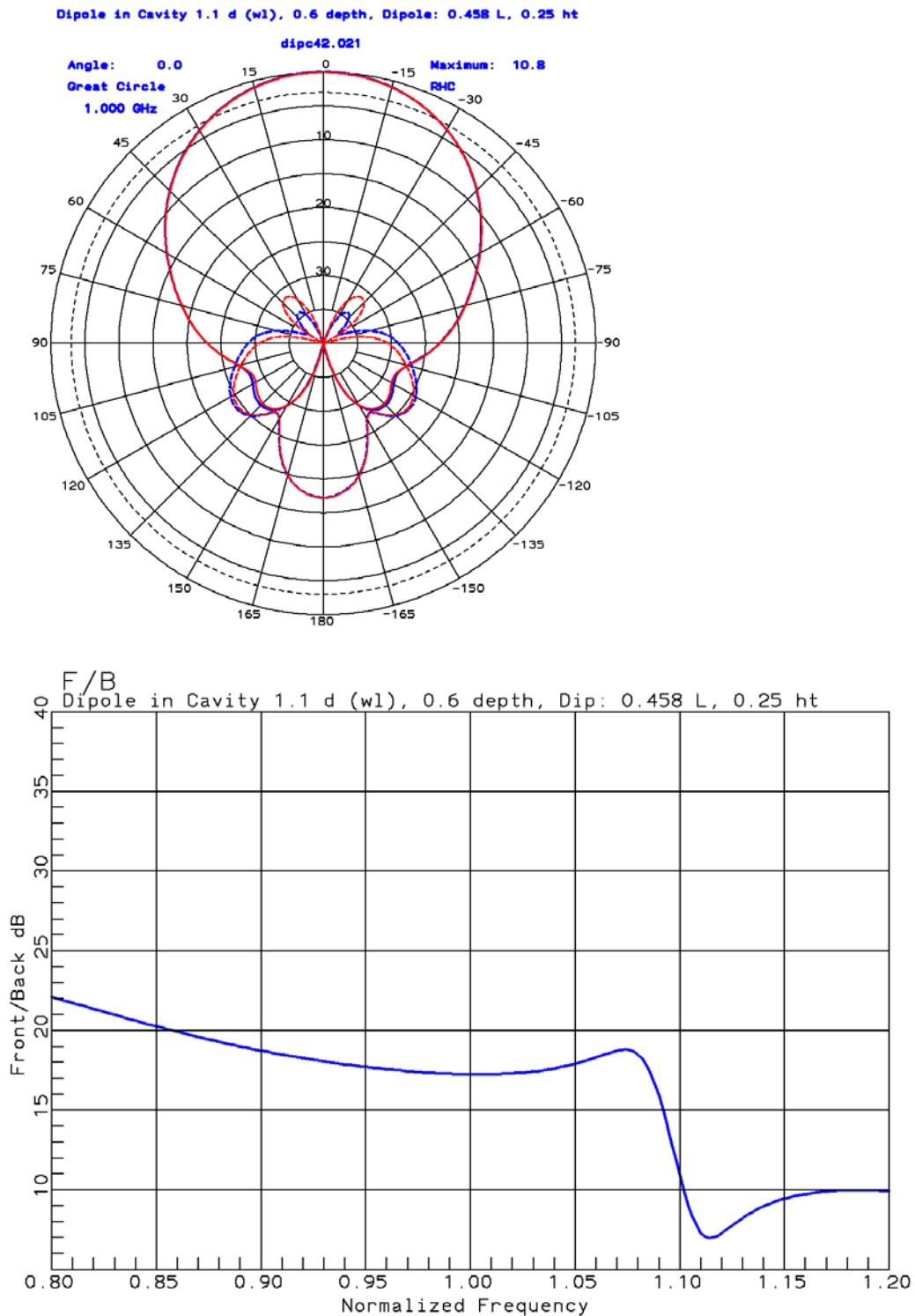


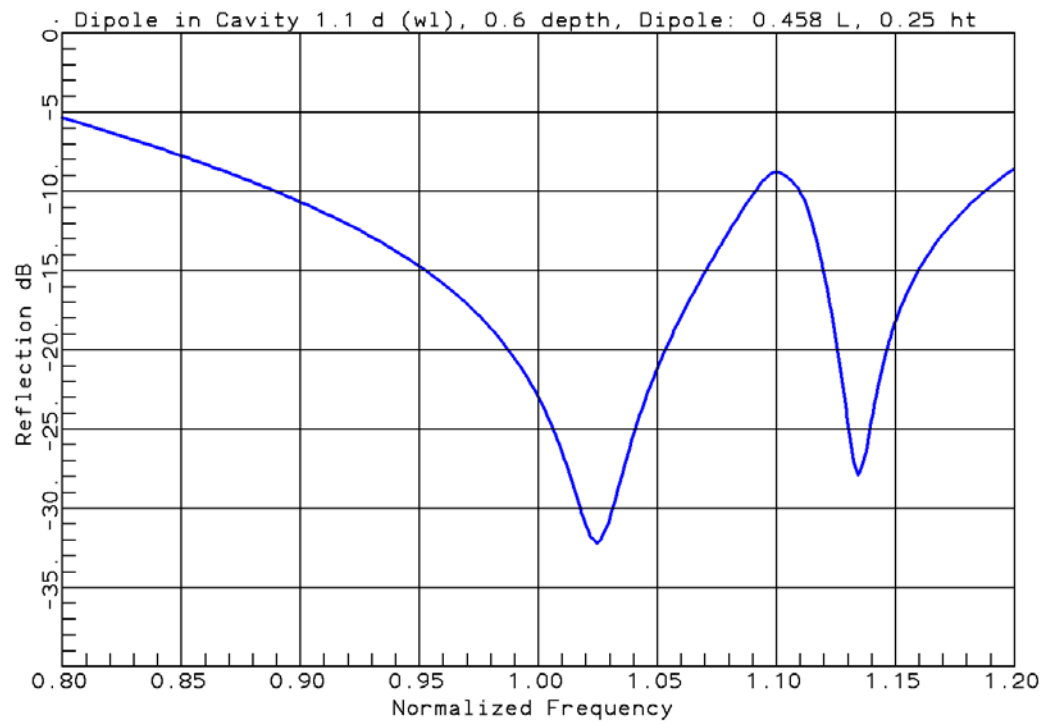
Chapter 5 Dipoles, Slots, and Loops



Cavity: 1.1λ Diameter Aperture, 0.6λ Depth, Dipole: 0.458λ , Height: 0.25λ

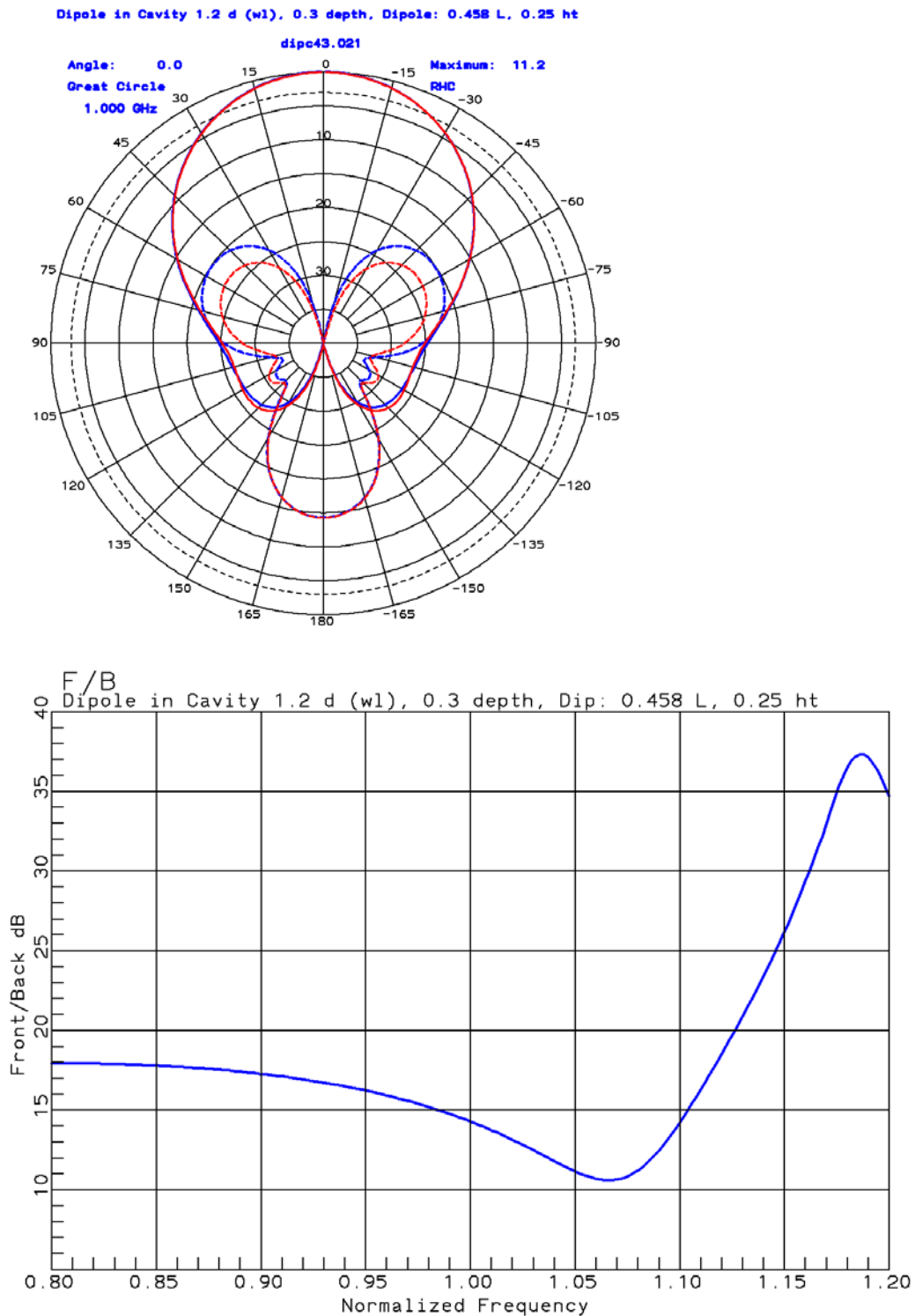
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



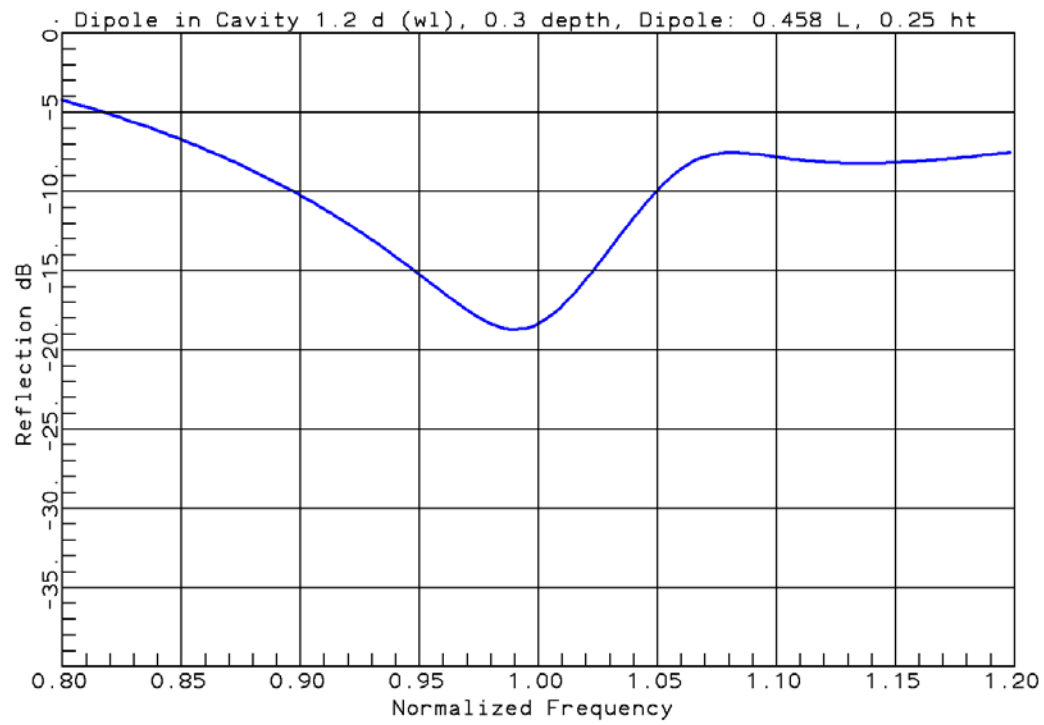


Cavity: 1.2λ Diameter Aperture, 0.3λ Depth, Dipole: 0.458λ , Height: 0.25λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

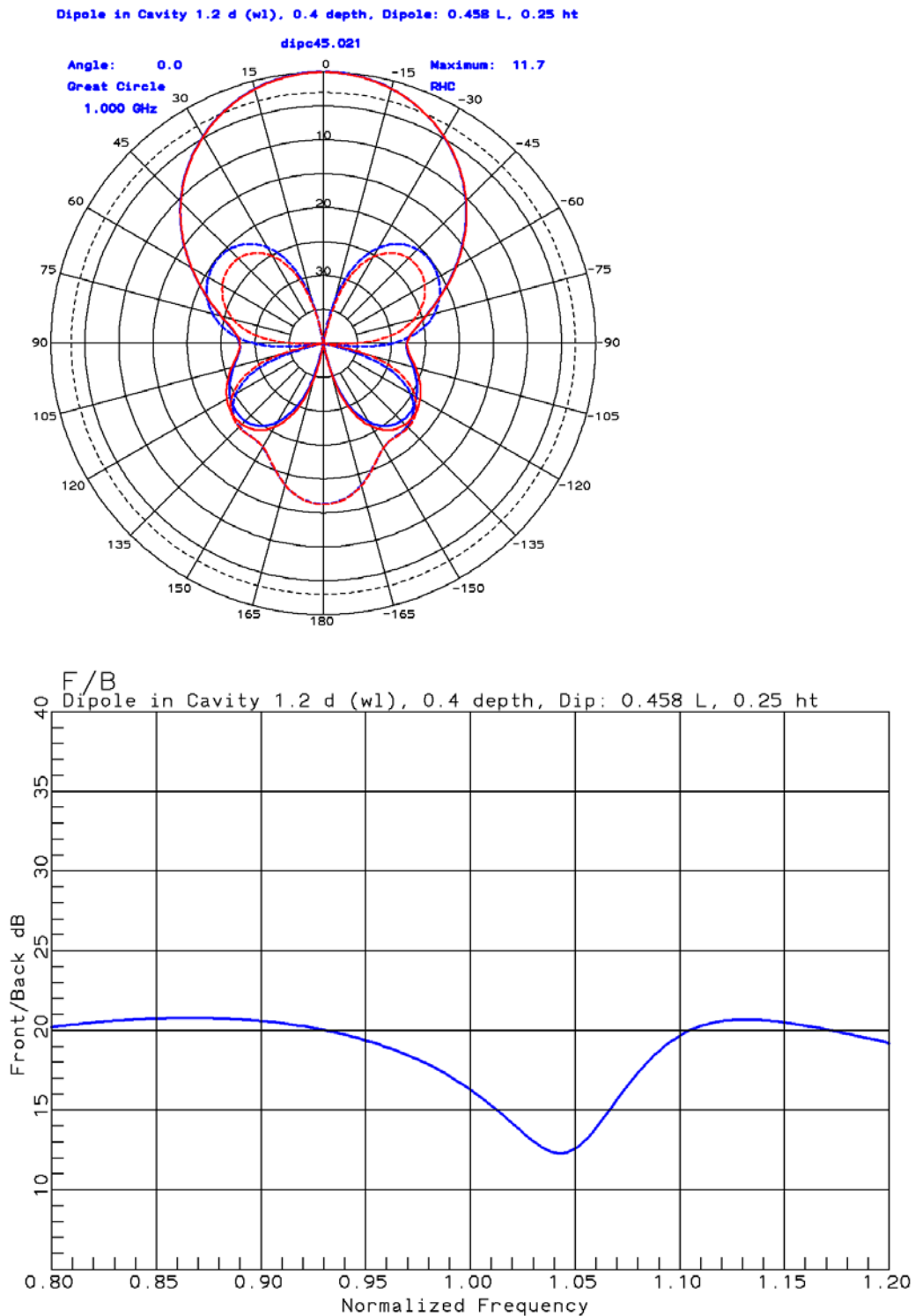


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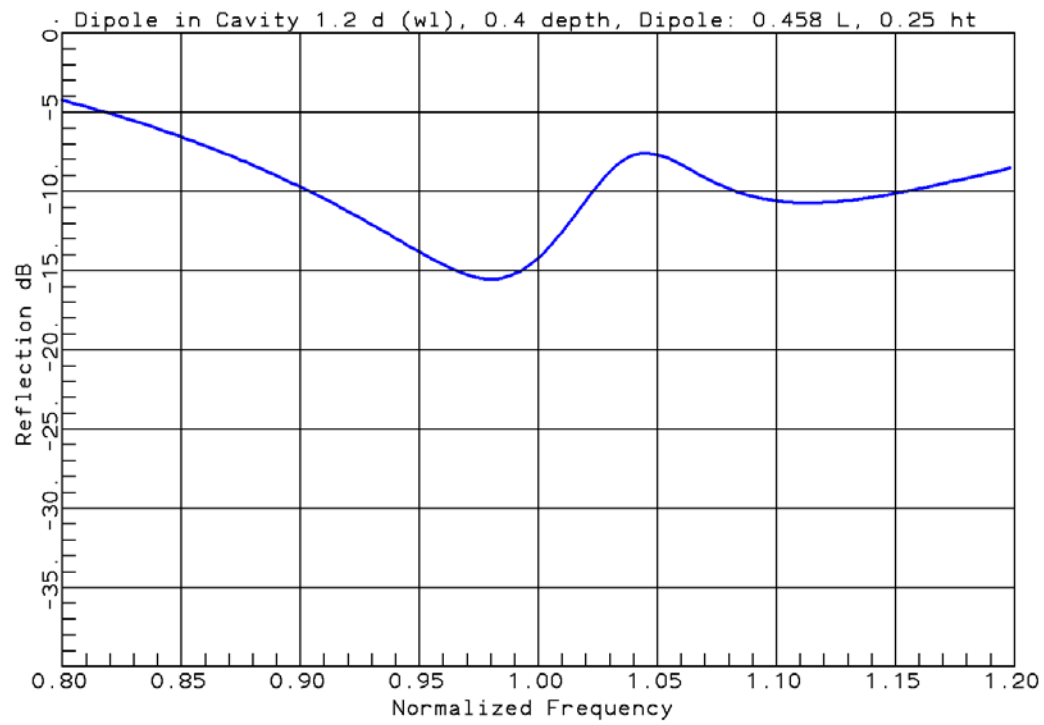


Cavity: 1.2λ Diameter Aperture, 0.4λ Depth, Dipole: 0.458λ , Height: 0.25λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

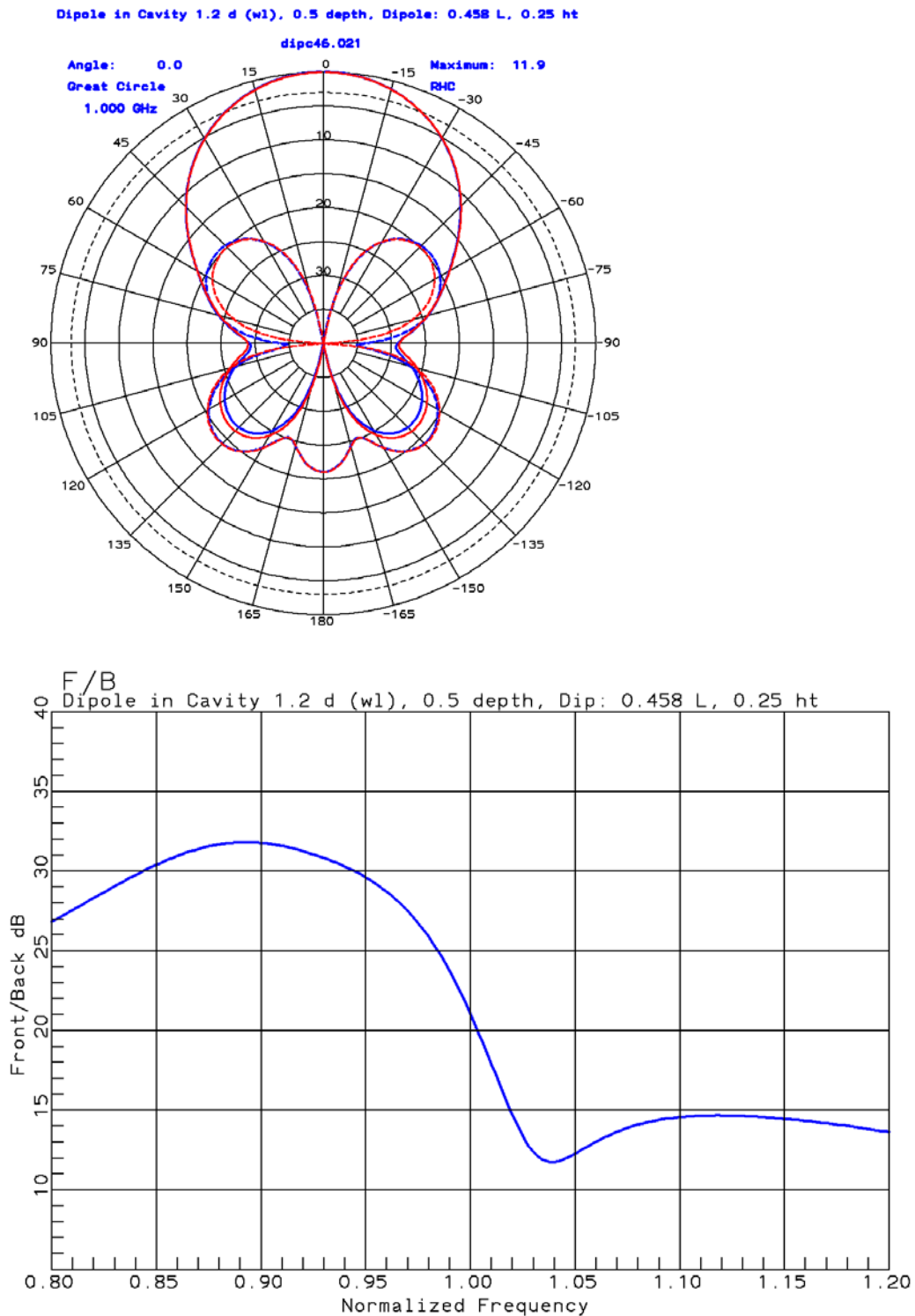


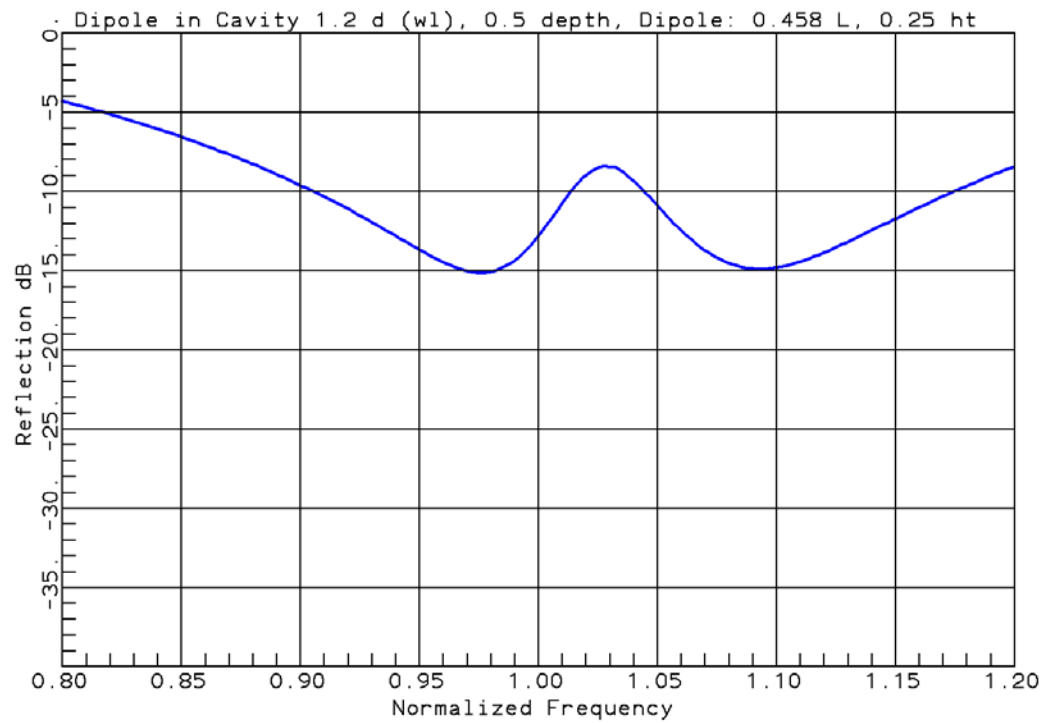
Chapter 5 Dipoles, Slots, and Loops



Cavity: 1.2λ Diameter Aperture, 0.5λ Depth, Dipole: 0.458λ , Height: 0.25λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

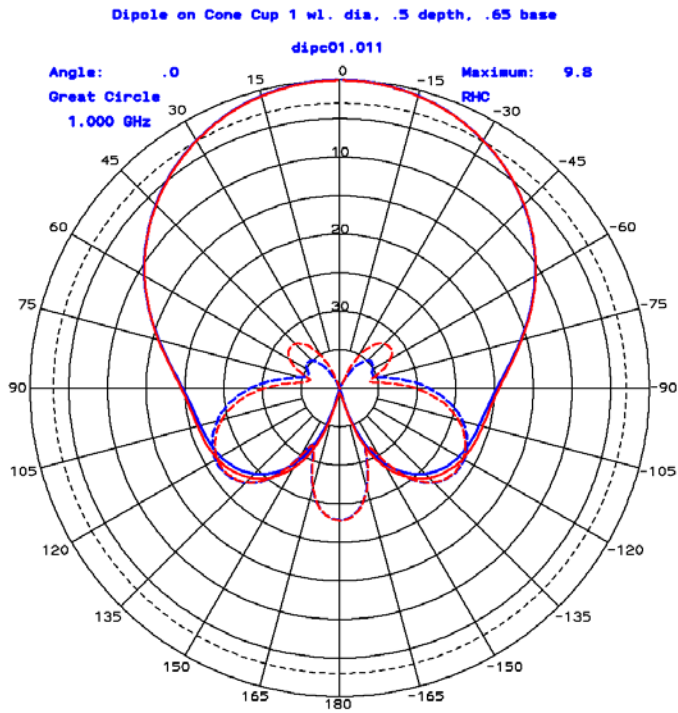




Tapered Cavity Designs

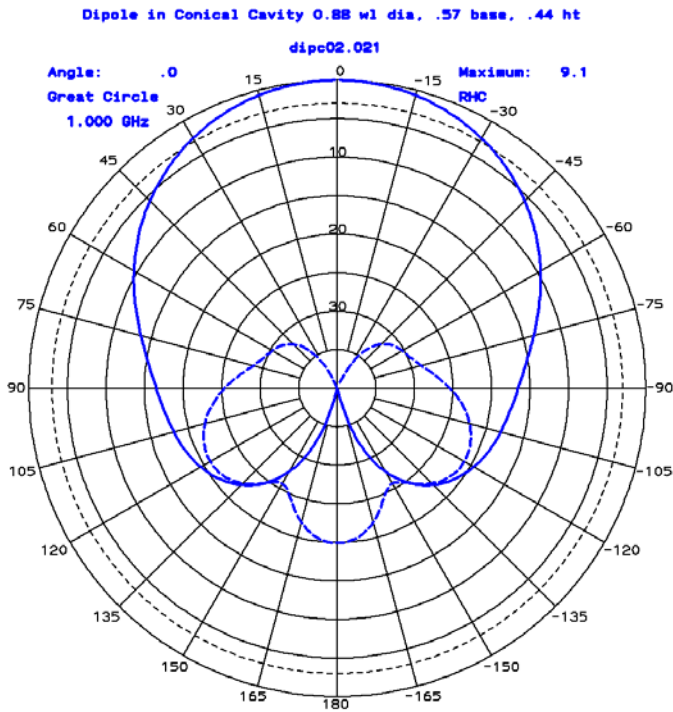
Cavity: 1.0λ Diameter Aperture, 0.5λ Depth, 0.65λ Diameter Base,
Dipole: 0.458λ , Height: 0.25λ

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



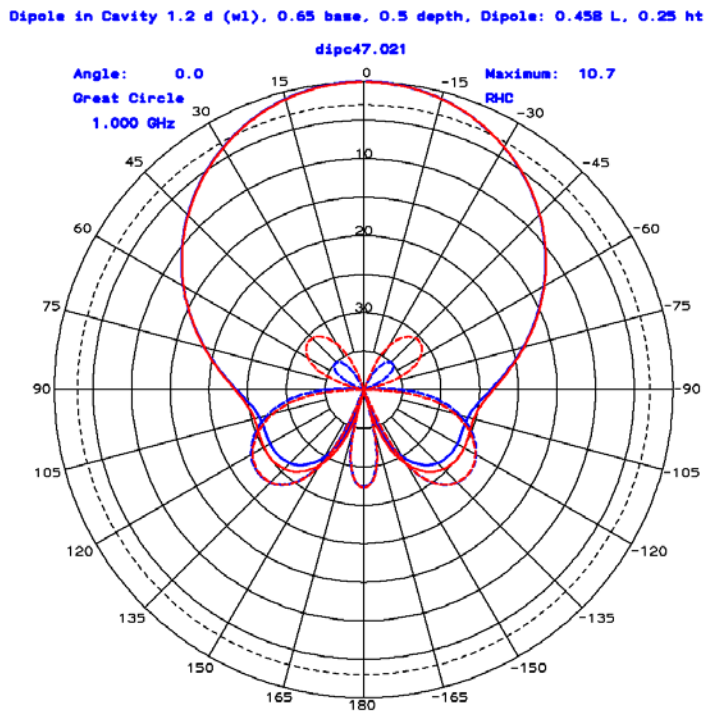
**Cavity: 0.88λ Diameter Aperture, 0.44λ Depth, 0.57λ Diameter Base,
Dipole: 0.458λ , Height: 0.25λ**

Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$

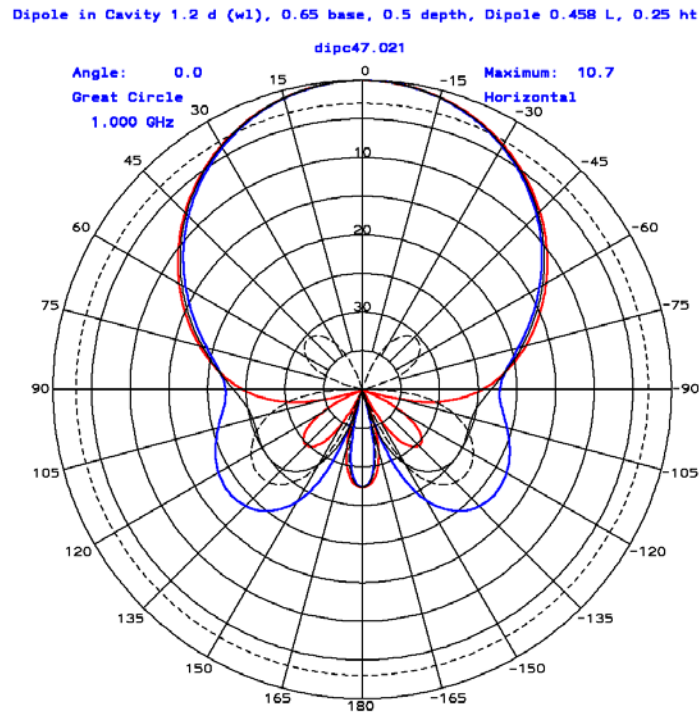


Cavity: 1.2λ Diameter Aperture, 0.5λ Depth, 0.65λ Diameter Base,
Dipole: 0.458λ , Height: 0.25λ

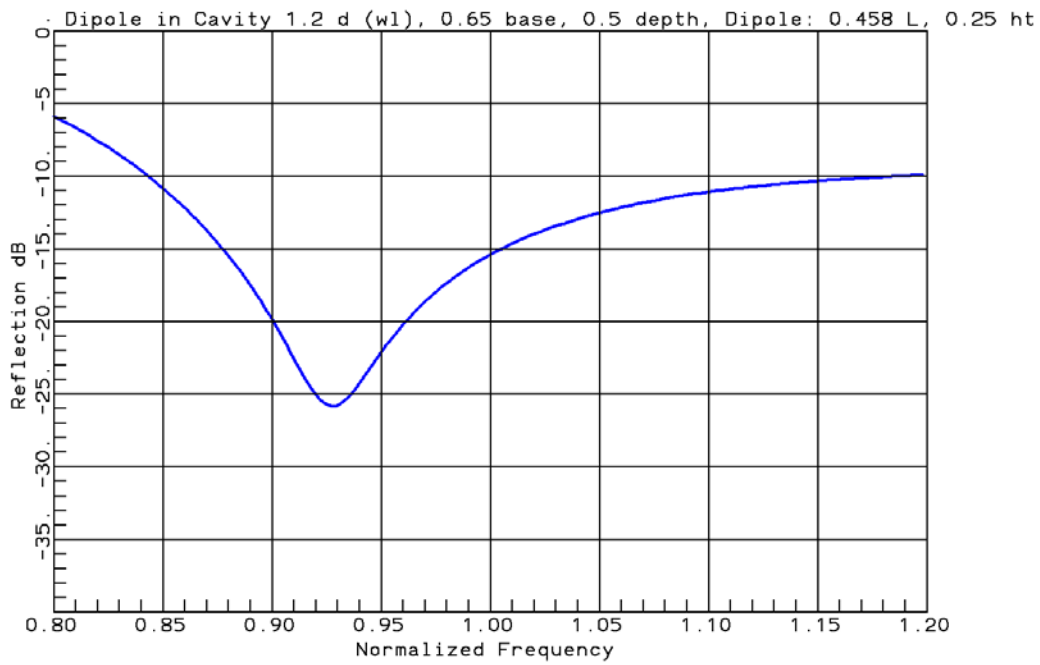
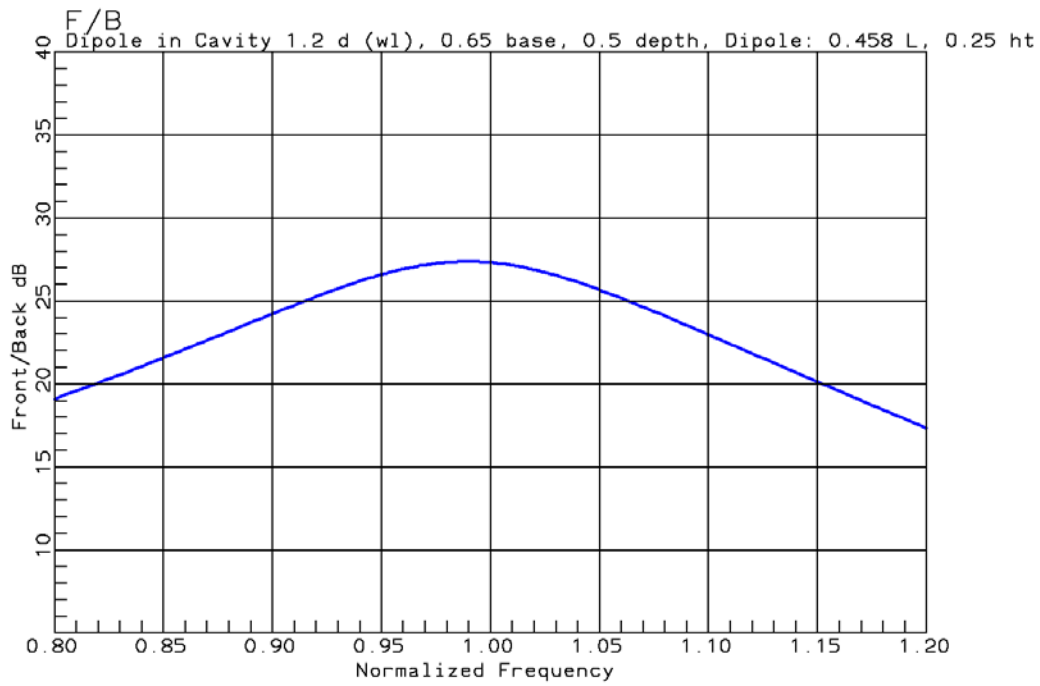
Circular Polarization Blue: $\phi = 0$, Red: $\phi = 45$



Linear Polarization Blue: $\phi = 0$, Red: $\phi = 90$, Black: $\phi = 45$

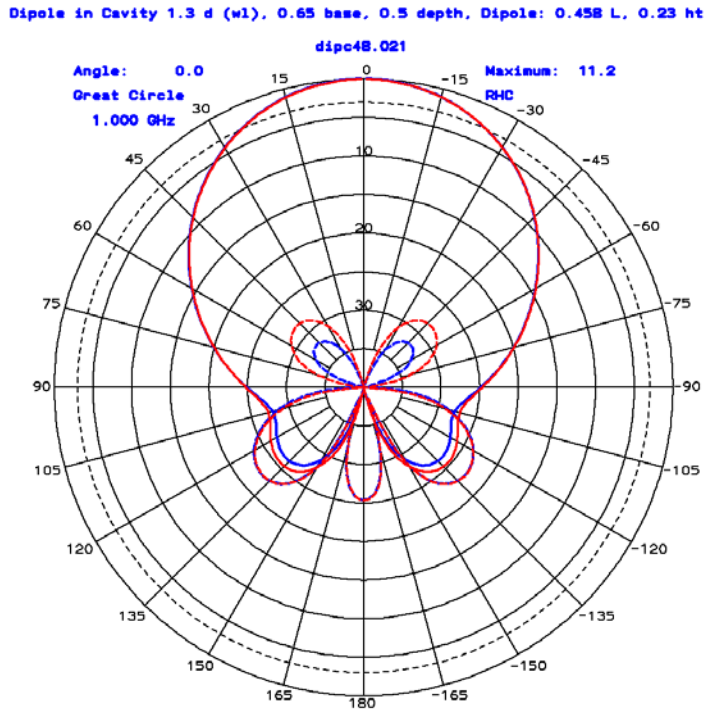


Chapter 5 Dipoles, Slots, and Loops

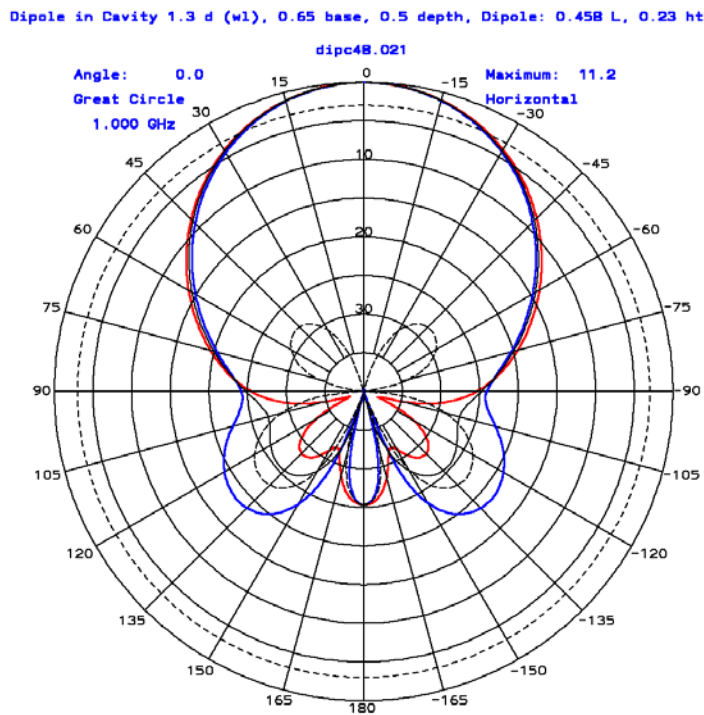


**Cavity: 1.3λ Diameter Aperture, 0.5λ Depth, 0.65λ Diameter Base,
Dipole: 0.458λ , Height: 0.23λ**

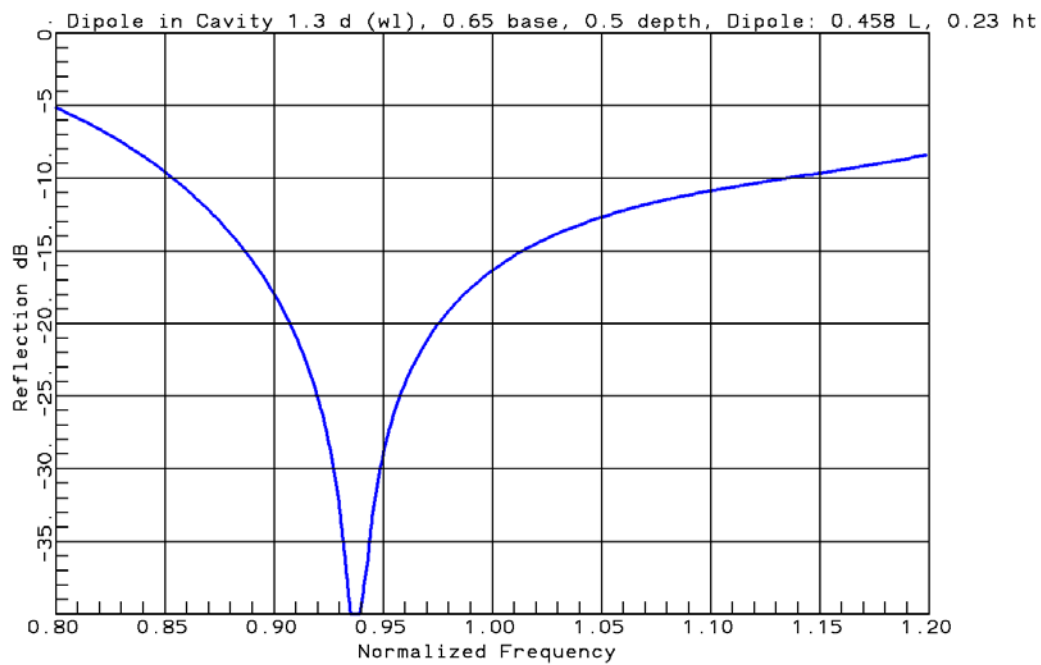
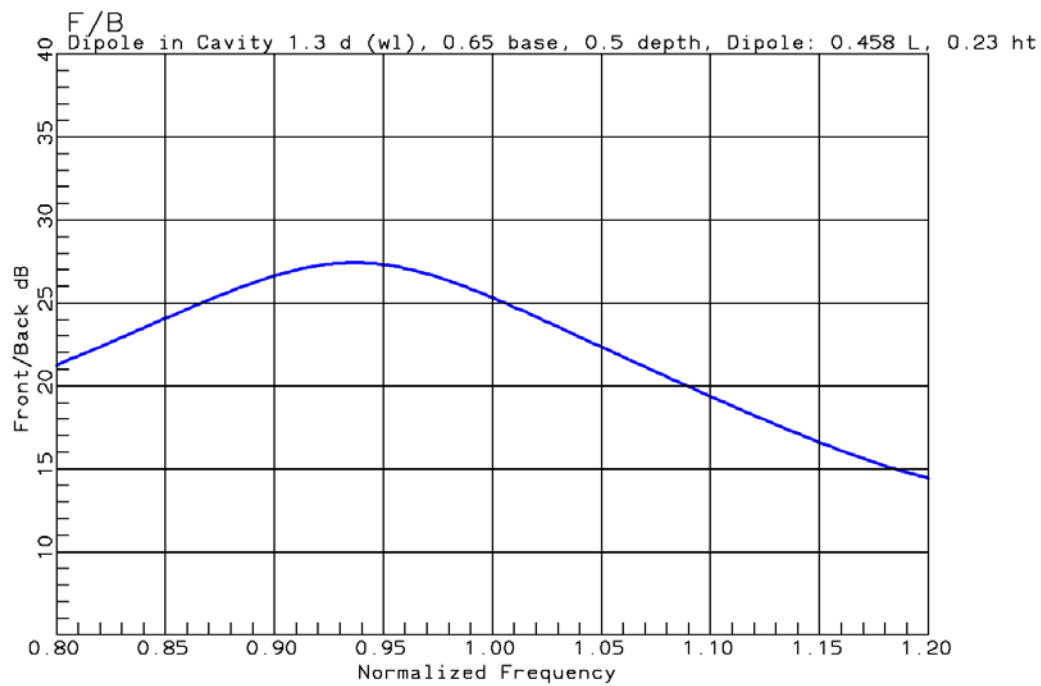
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



Linear Polarization Blue: $\varphi = 0$, Red: $\varphi = 90$, Black: $\varphi = 45$

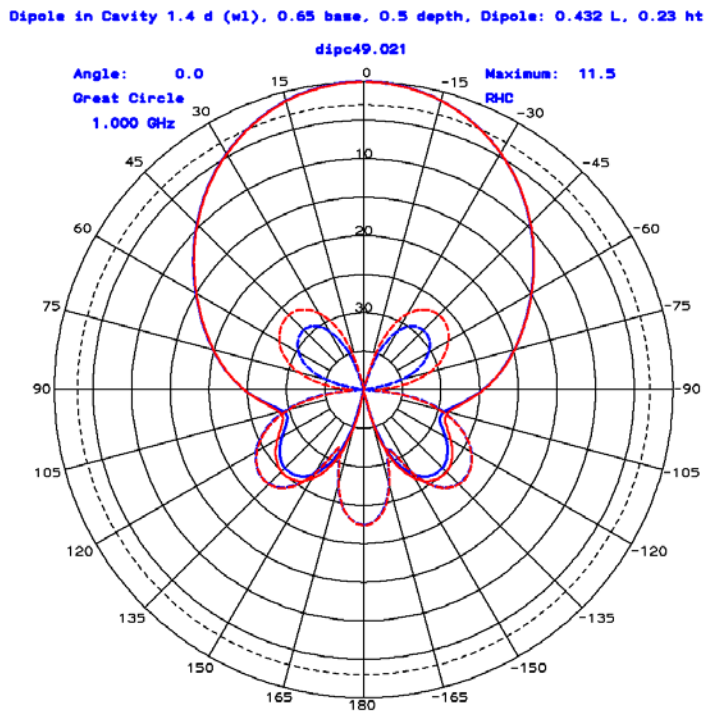


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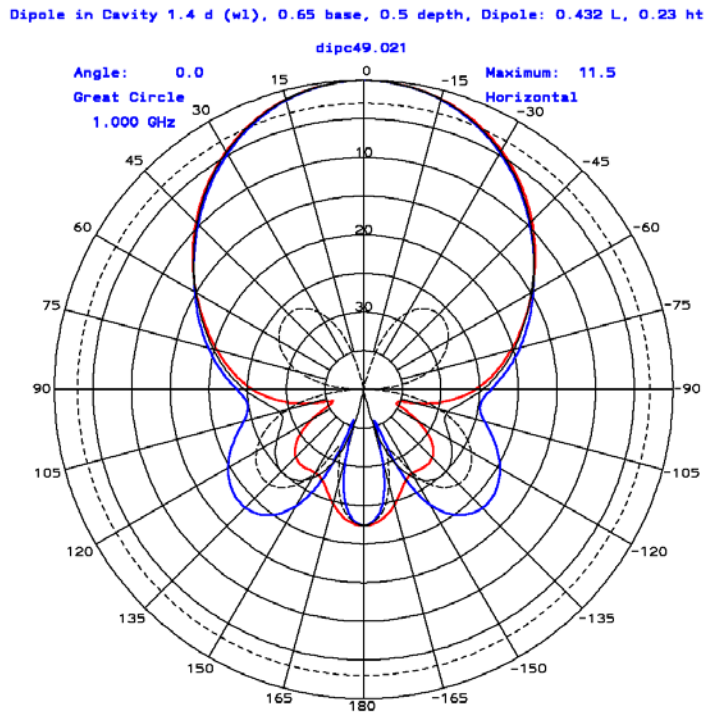


Cavity: 1.4λ Diameter Aperture, 0.5λ Depth, 0.65λ Diameter Base,
Dipole: 0.432λ , Height: 0.23λ

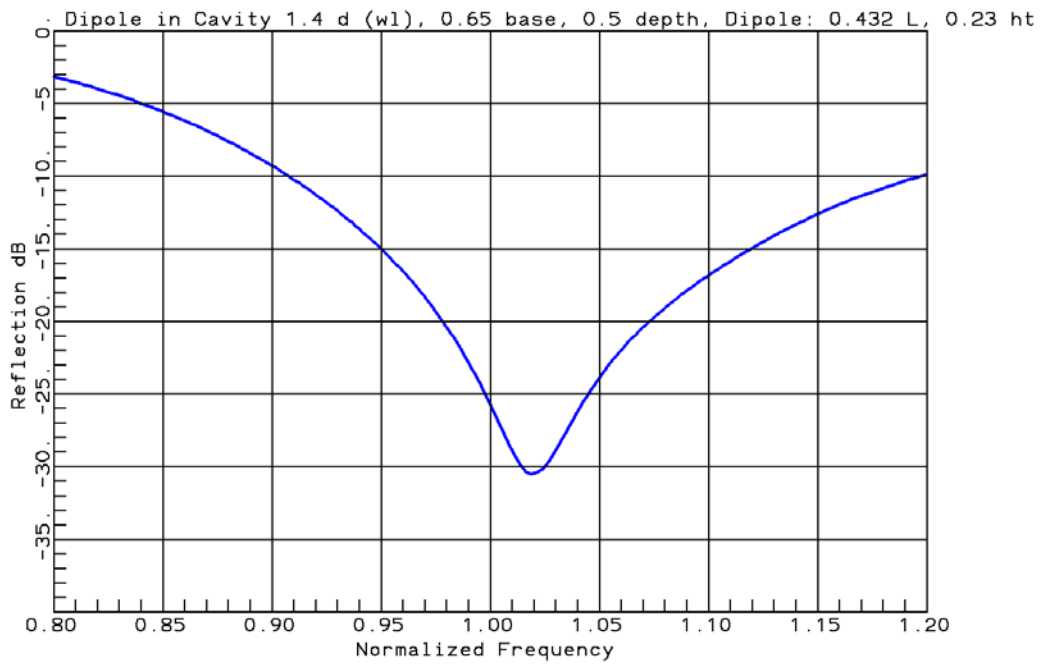
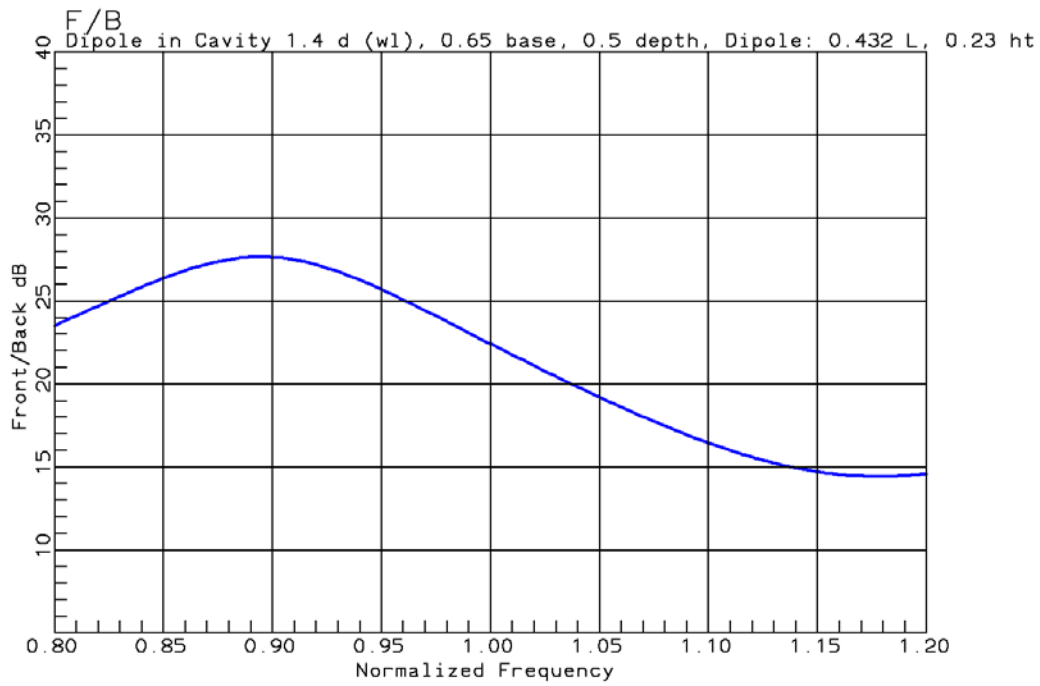
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



Linear Polarization Blue: $\varphi = 0$, Red: $\varphi = 90$, Black: $\varphi = 45$

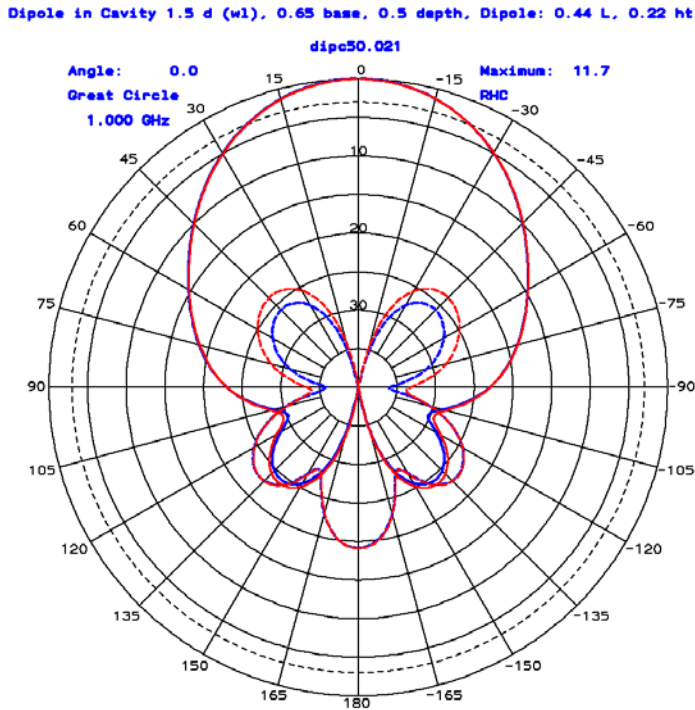


Chapter 5 Dipoles, Slots, and Loops

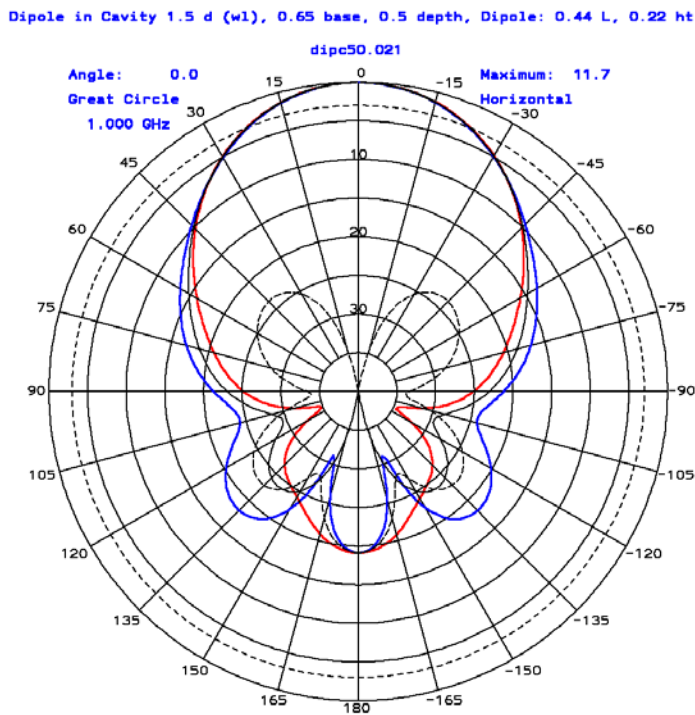


**Cavity: 1.5λ Diameter Aperture, 0.5λ Depth, 0.65λ Diameter Base,
Dipole: 0.44λ , Height: 0.22λ**

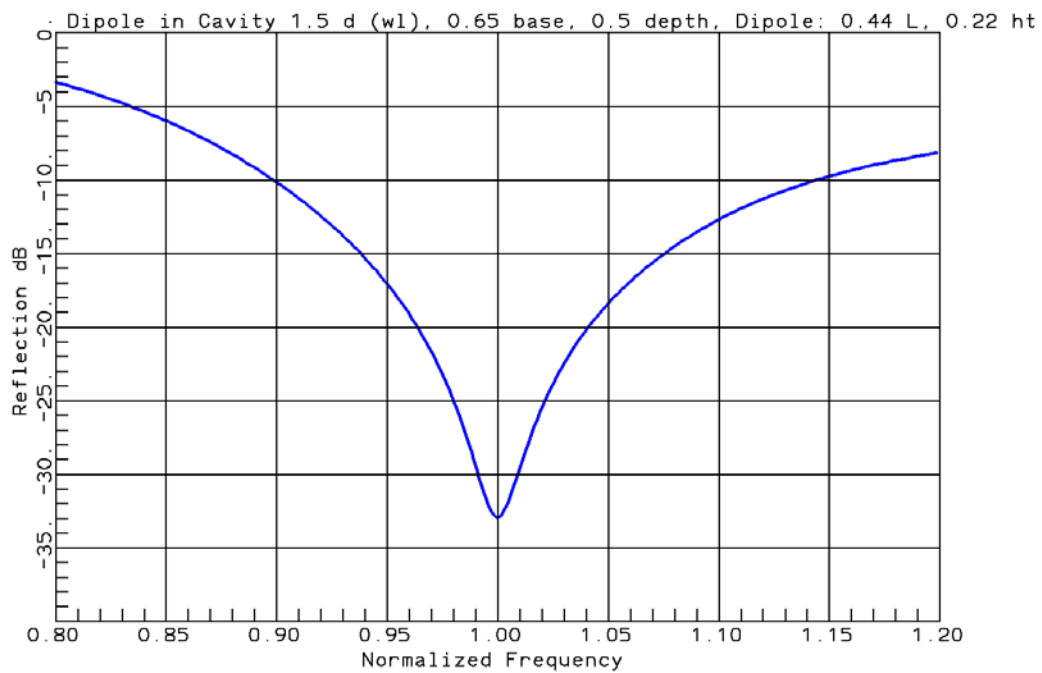
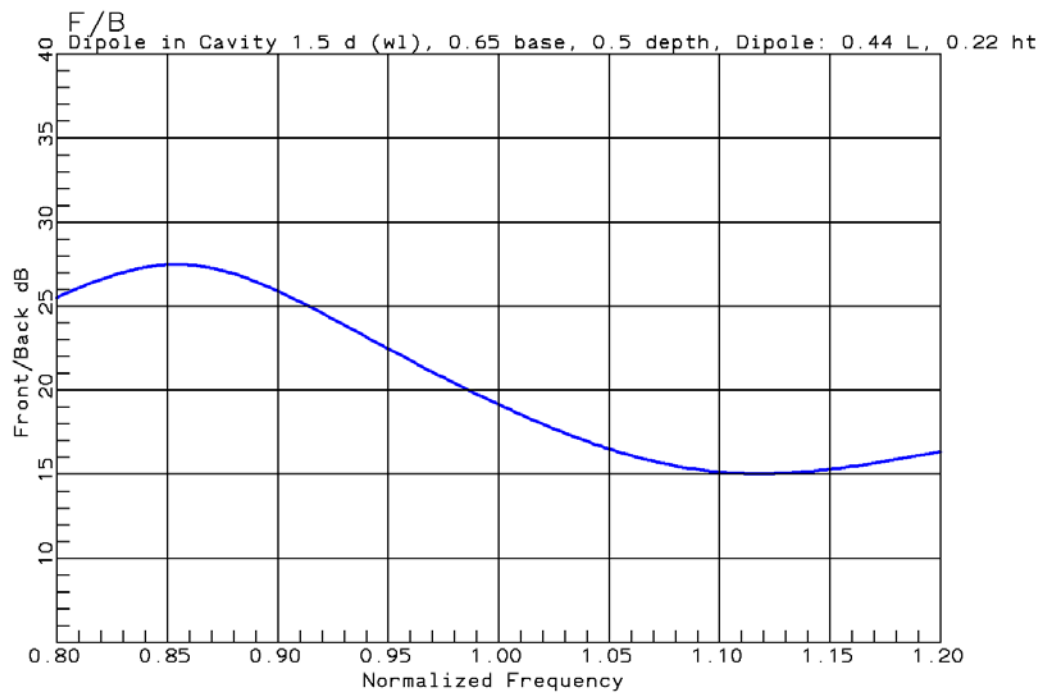
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



Linear Polarization Blue: $\varphi = 0$, Red: $\varphi = 90$, Black: $\varphi = 45$

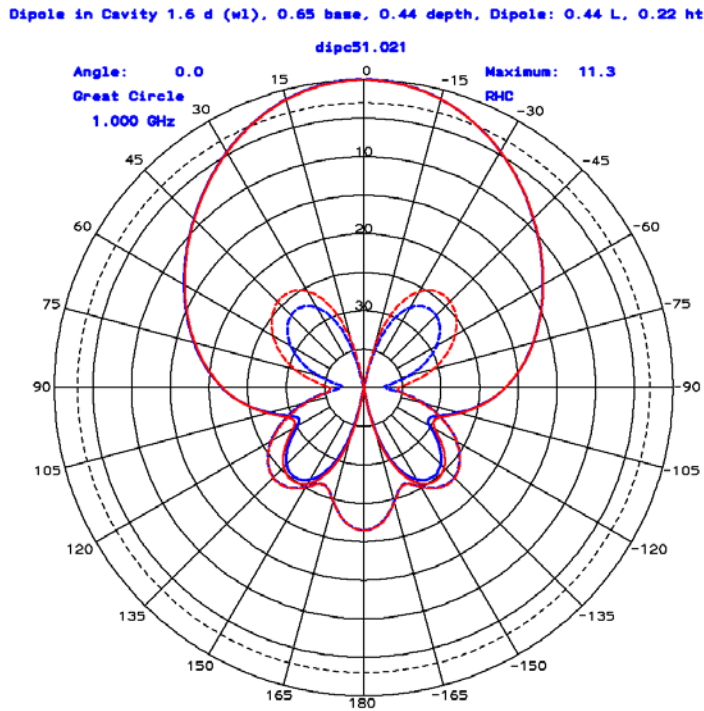


Chapter 5 Dipoles, Slots, and Loops

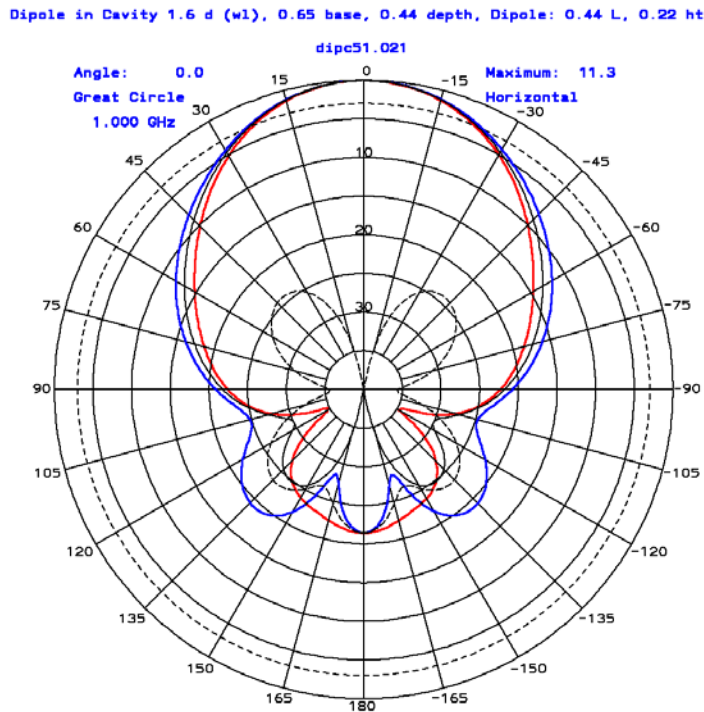


**Cavity: 1.6λ Diameter Aperture, 0.44λ Depth, 0.65λ Diameter Base,
Dipole: 0.44λ , Height: 0.22λ**

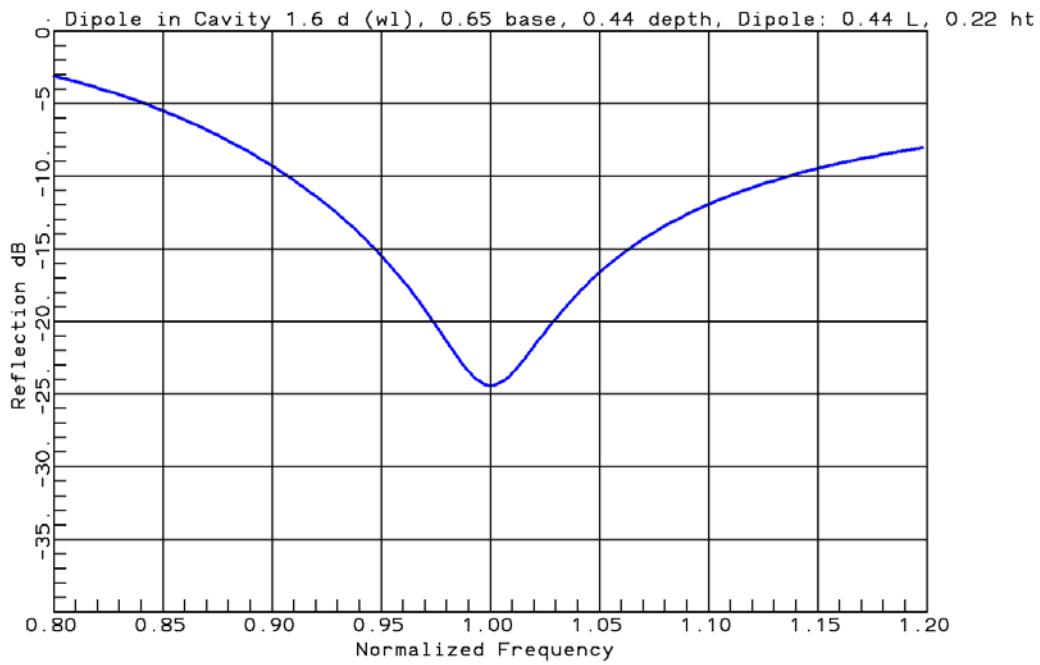
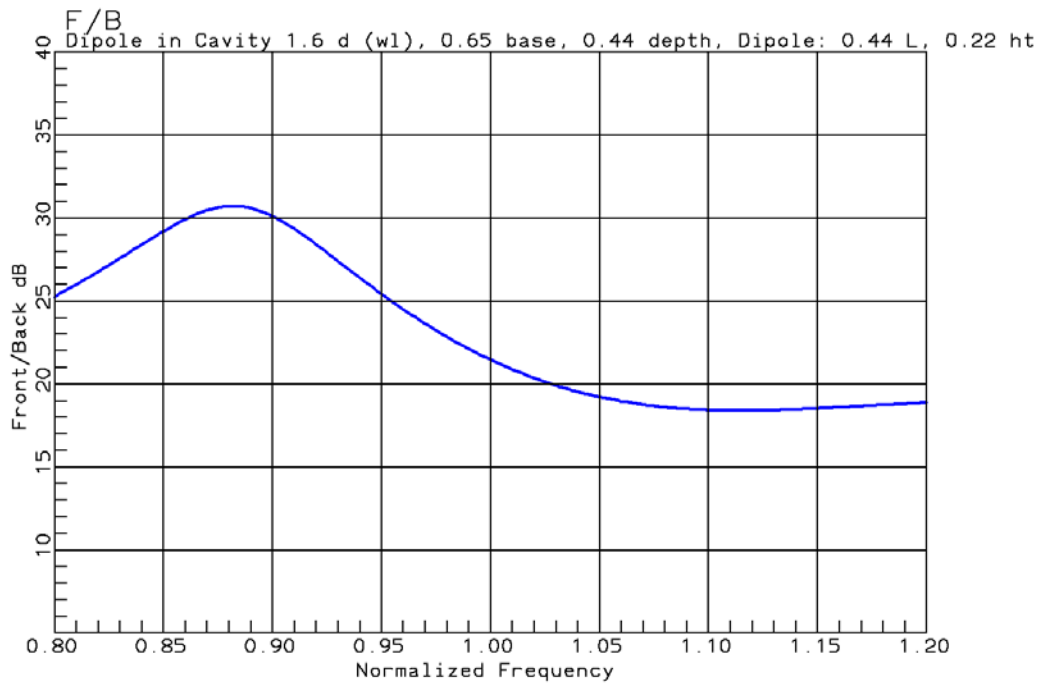
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



Linear Polarization Blue: $\varphi = 0$, Red: $\varphi = 90$, Black: $\varphi = 45$

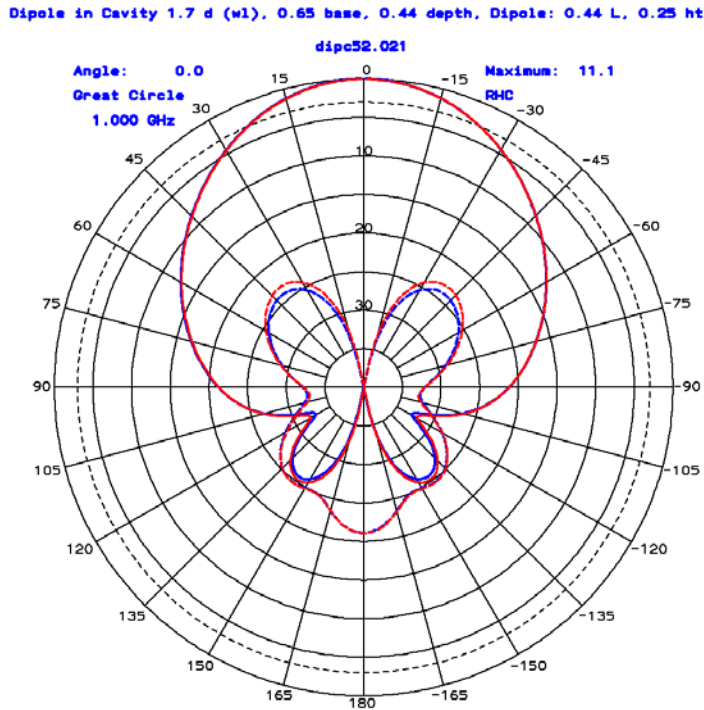


Chapter 5 Dipoles, Slots, and Loops

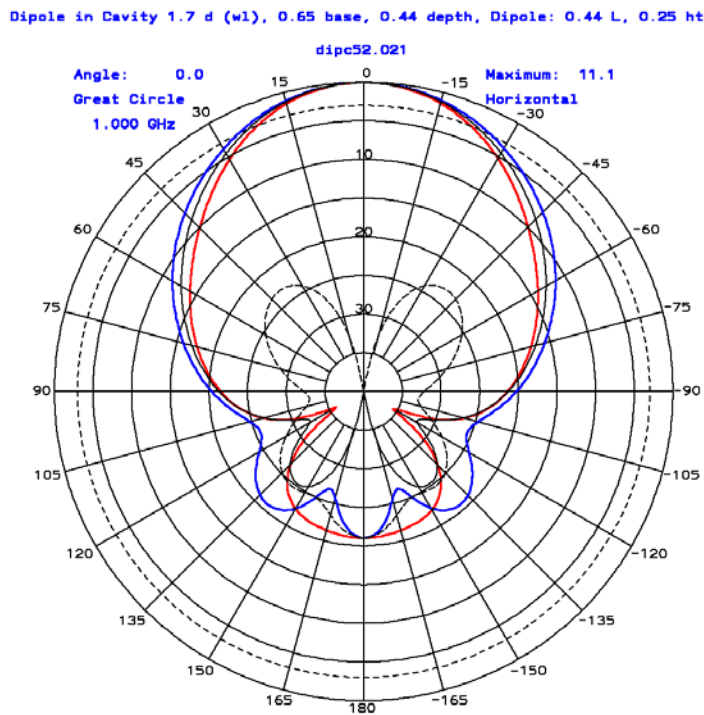


**Cavity: 1.7λ Diameter Aperture, 0.44λ Depth, 0.65λ Diameter Base,
Dipole: 0.44λ , Height: 0.25λ**

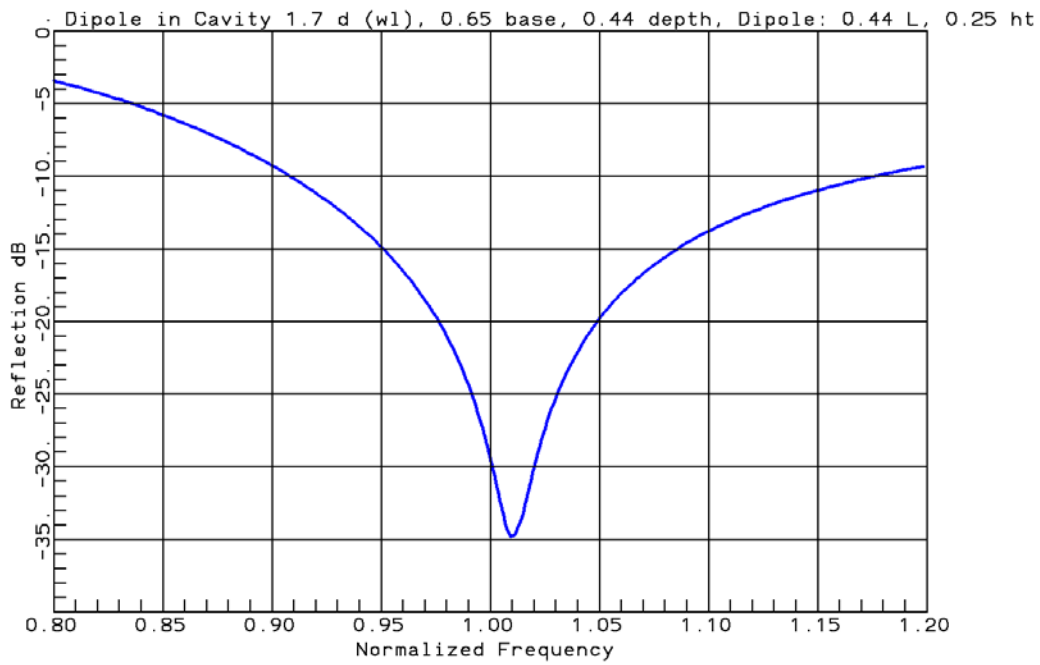
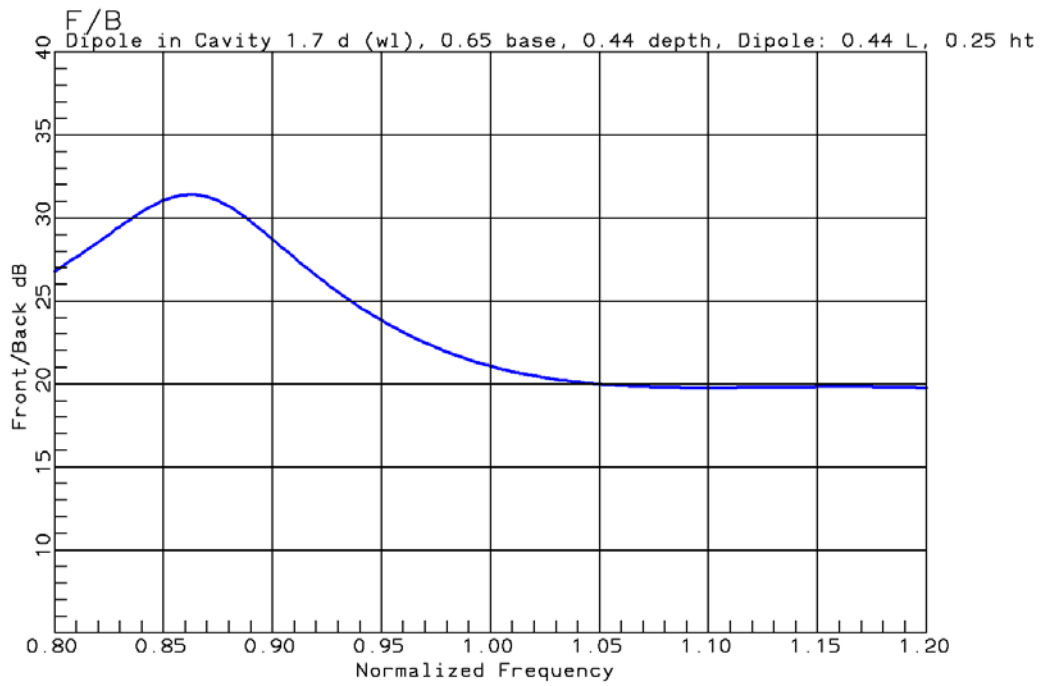
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



Linear Polarization Blue: $\varphi = 0$, Red: $\varphi = 90$, Black: $\varphi = 45$

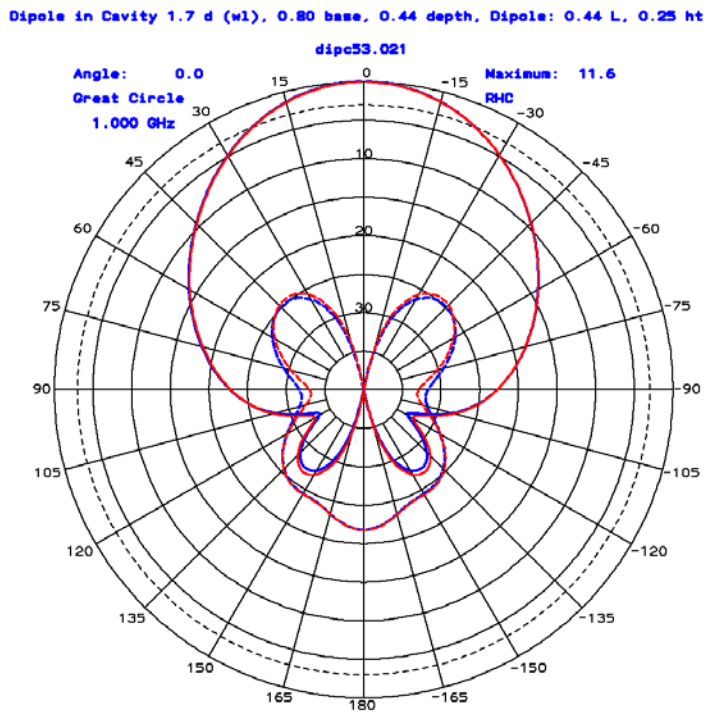


Chapter 5 Dipoles, Slots, and Loops

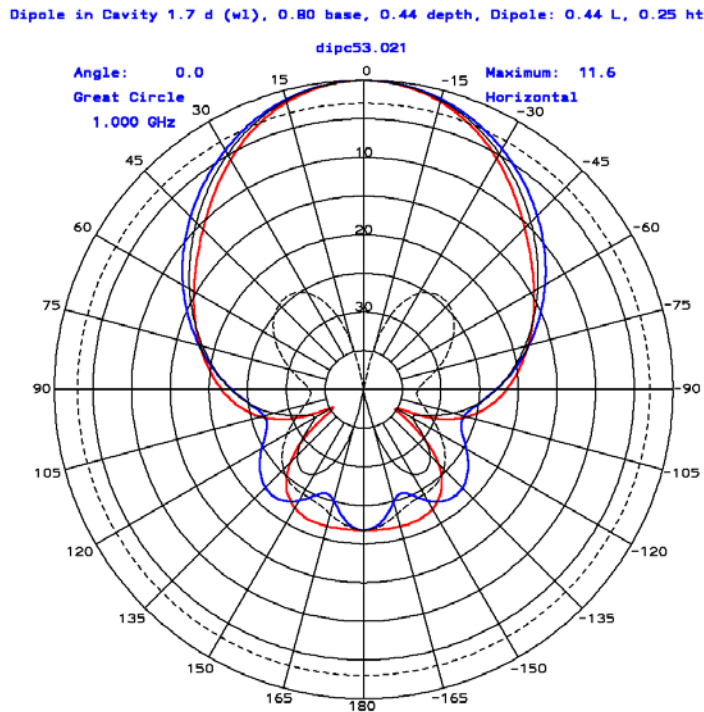


**Cavity: 1.7λ Diameter Aperture, 0.44λ Depth, 0.80λ Diameter Base,
Dipole: 0.44λ , Height: 0.25λ**

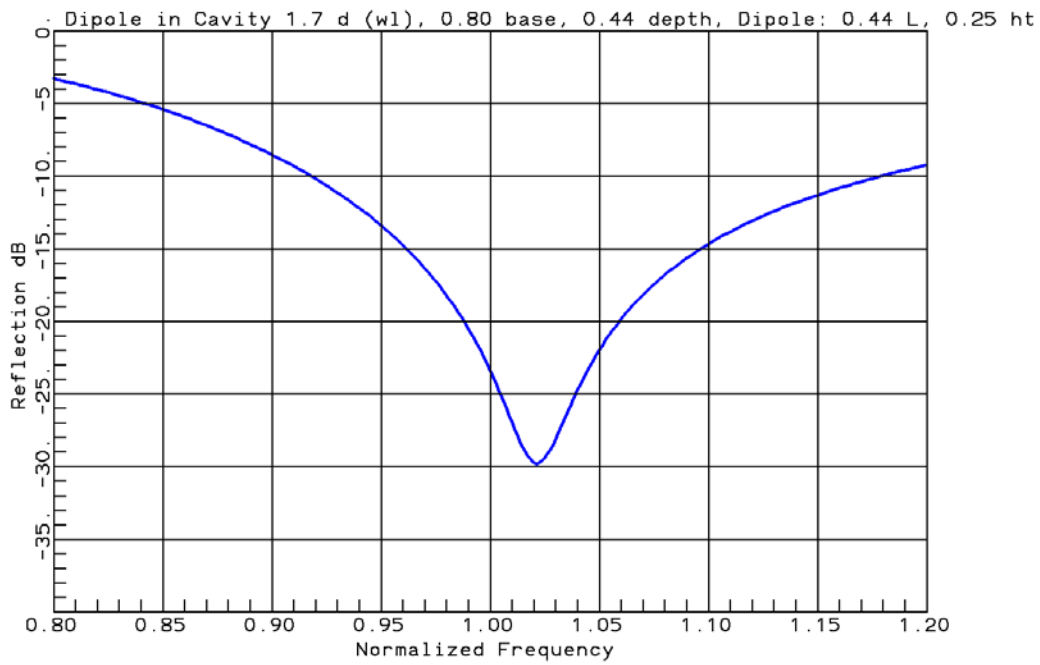
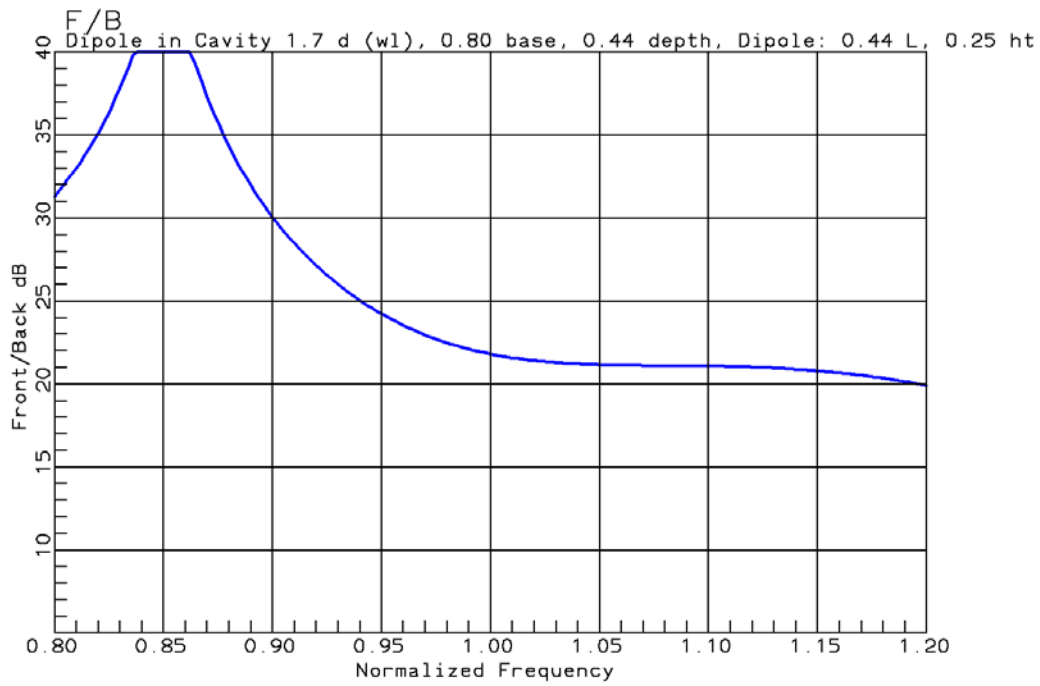
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



Linear Polarization Blue: $\varphi = 0$, Red: $\varphi = 90$, Black: $\varphi = 45$

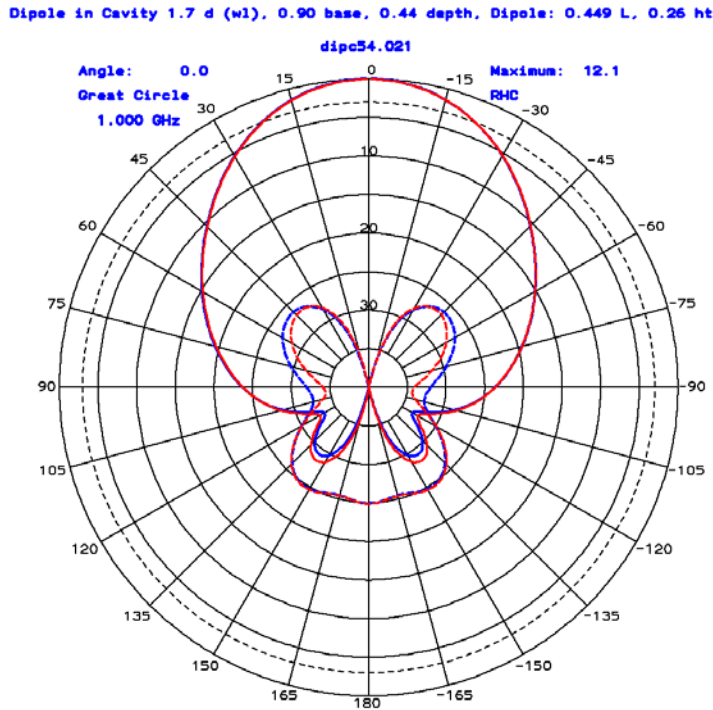


Chapter 5 Dipoles, Slots, and Loops

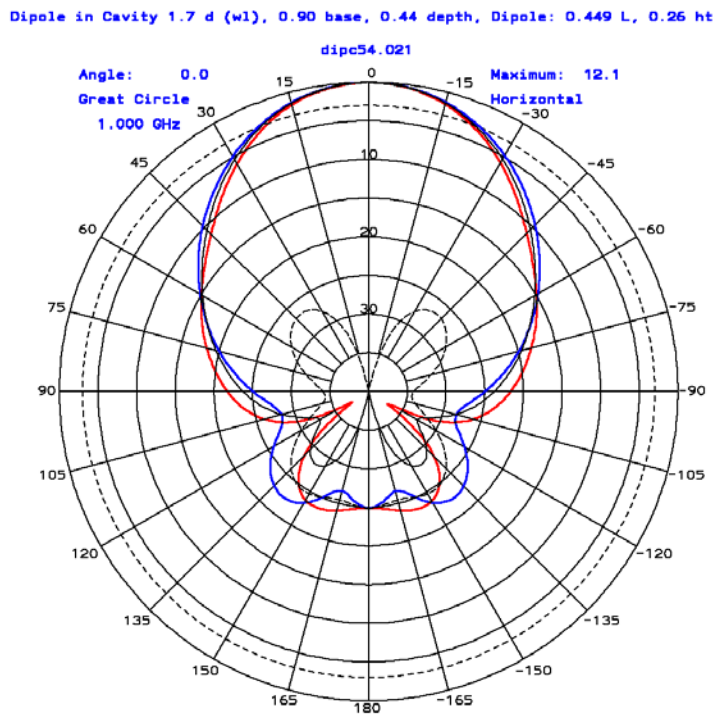


**Cavity: 1.7λ Diameter Aperture, 0.44λ Depth, 0.90λ Diameter Base,
Dipole: 0.449λ , Height: 0.26λ**

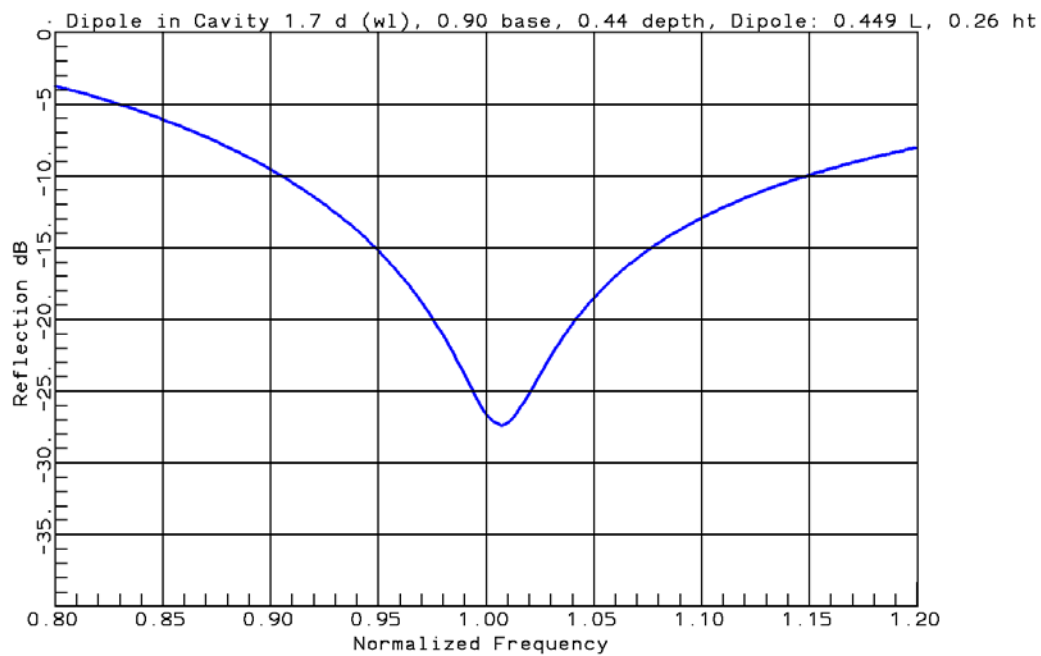
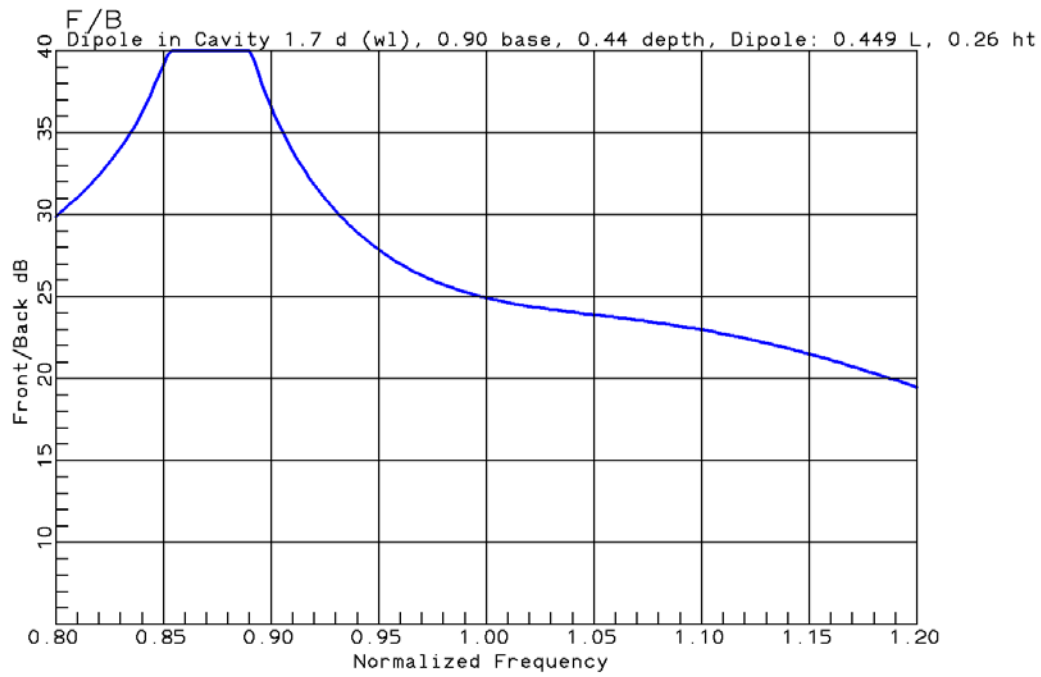
Circular Polarization Blue: $\varphi = 0$, Red: $\varphi = 45$



Linear Polarization Blue: $\varphi = 0$, Red: $\varphi = 90$, Black: $\varphi = 45$

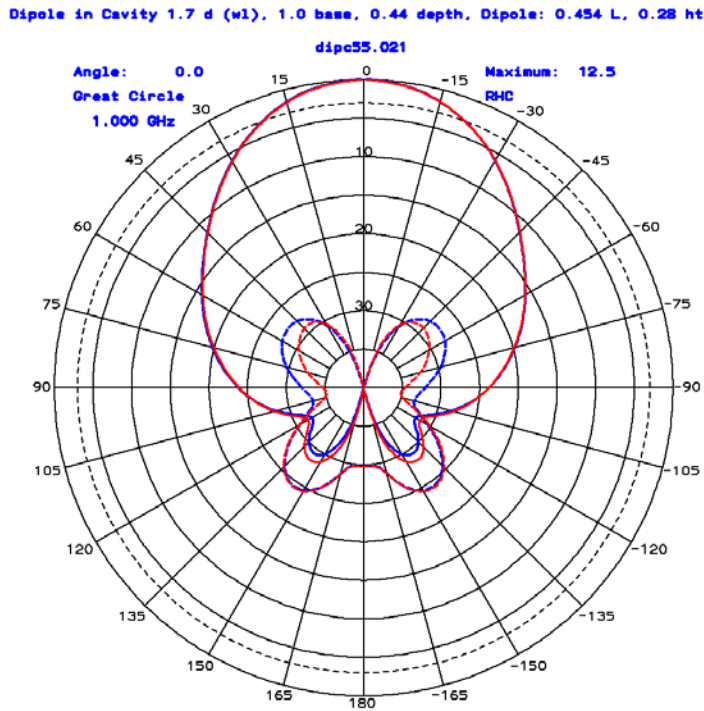


Chapter 5 Dipoles, Slots, and Loops

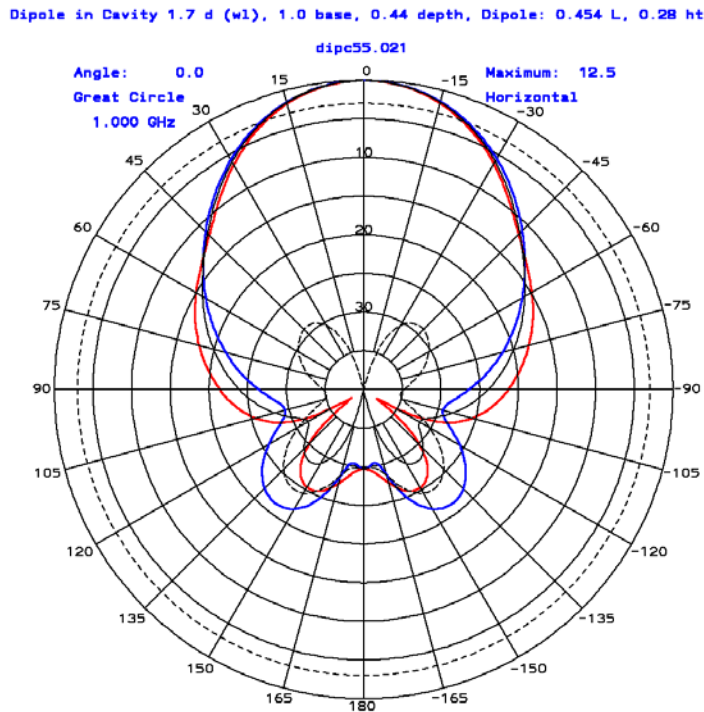


Cavity: 1.7λ Diameter Aperture, 0.44λ Depth, 1.0λ Diameter Base,
Dipole: 0.454λ , Height: 0.28λ

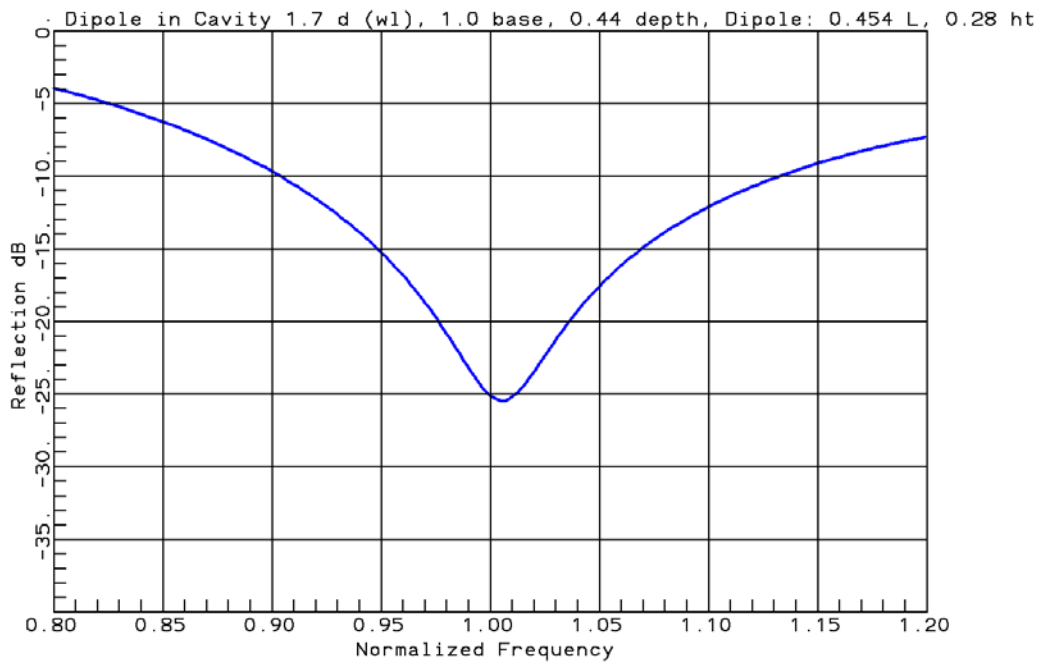
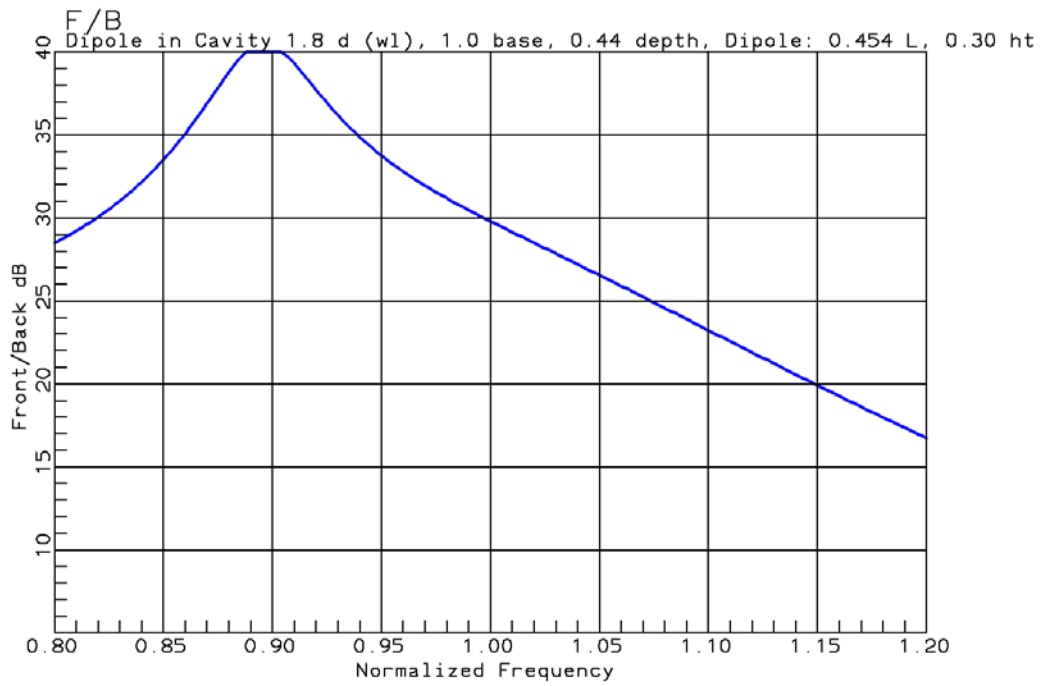
Circular Polarization Blue: $\phi = 0$, Red: $\phi = 45$



Linear Polarization Blue: $\phi = 0$, Red: $\phi = 90$, Black: $\phi = 45$

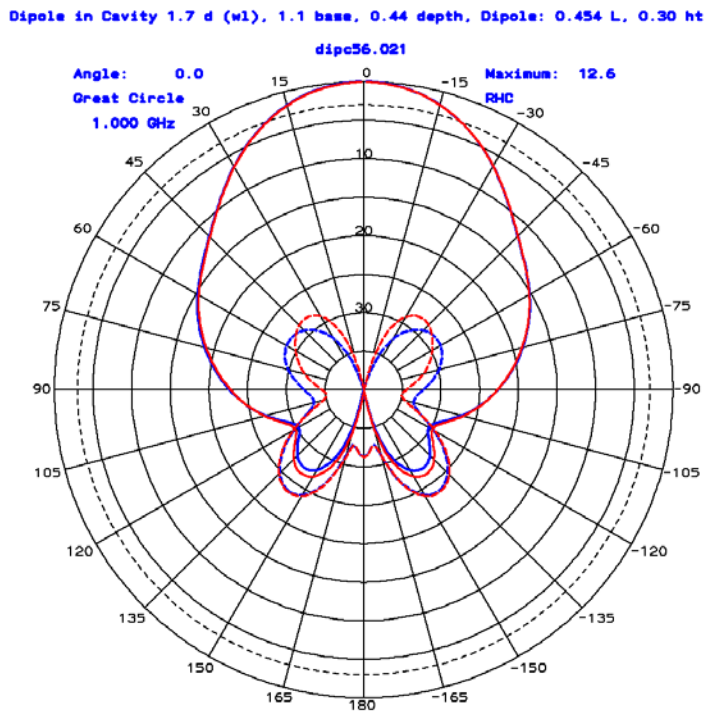


Chapter 5 Dipoles, Slots, and Loops

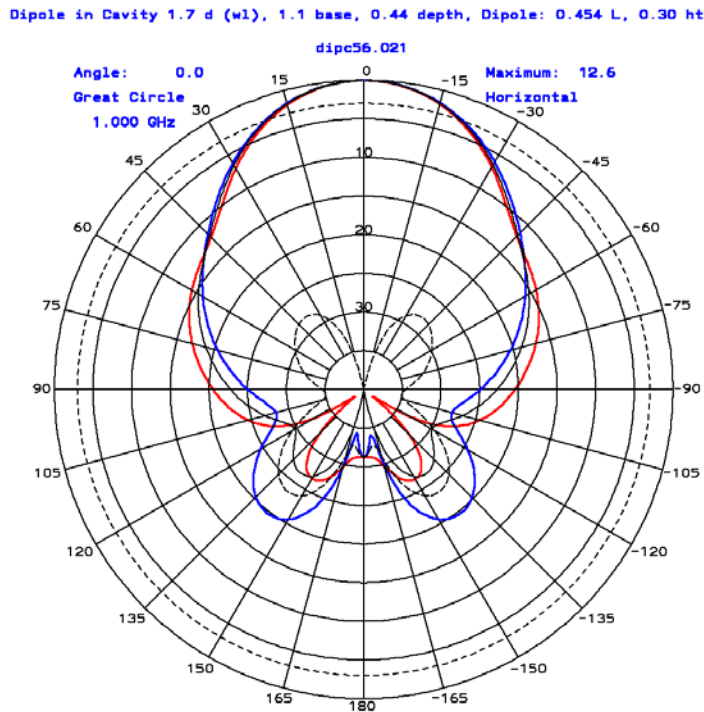


Cavity: 1.7λ Diameter Aperture, 0.44λ Depth, 1.1λ Diameter Base,
Dipole: 0.454λ , Height: 0.30λ

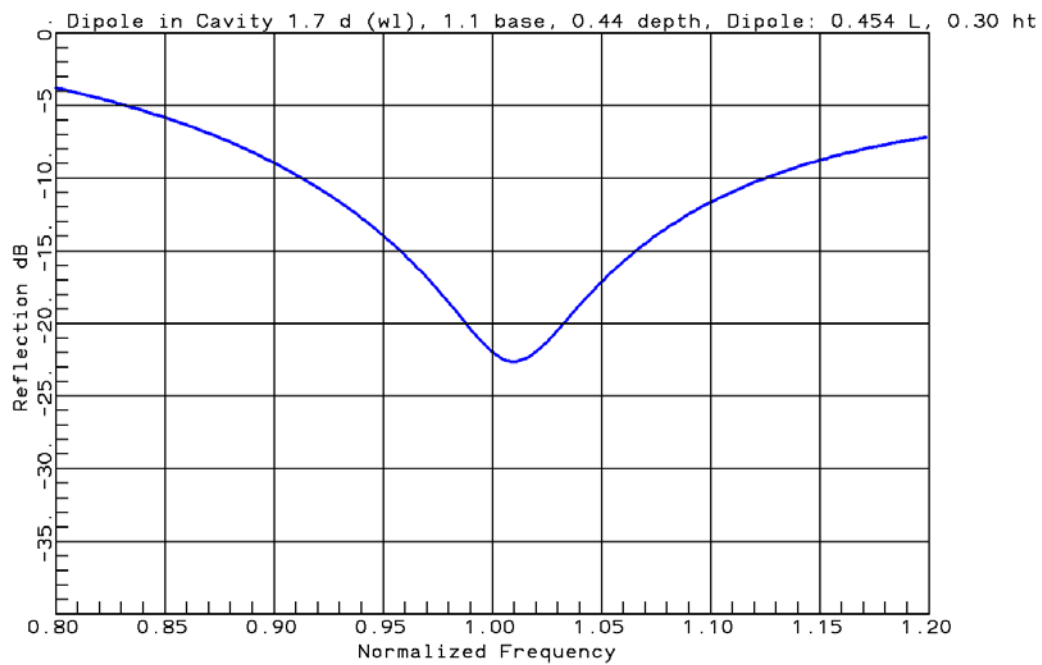
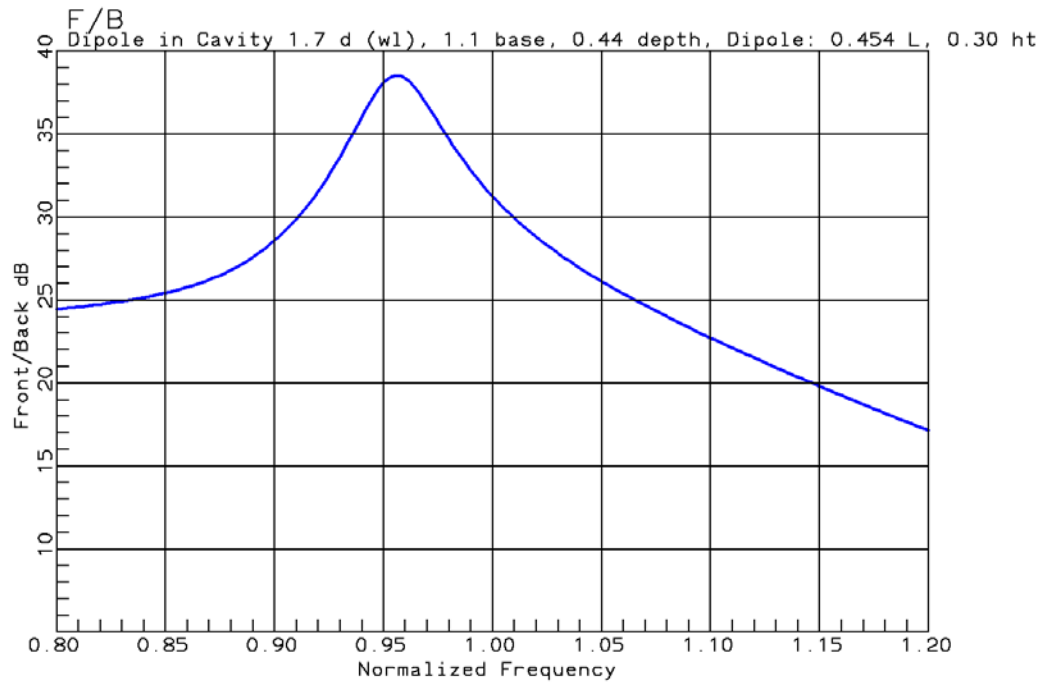
Circular Polarization Blue: $\phi = 0$, Red: $\phi = 45$



Linear Polarization Blue: $\phi = 0$, Red: $\phi = 90$, Black: $\phi = 45$

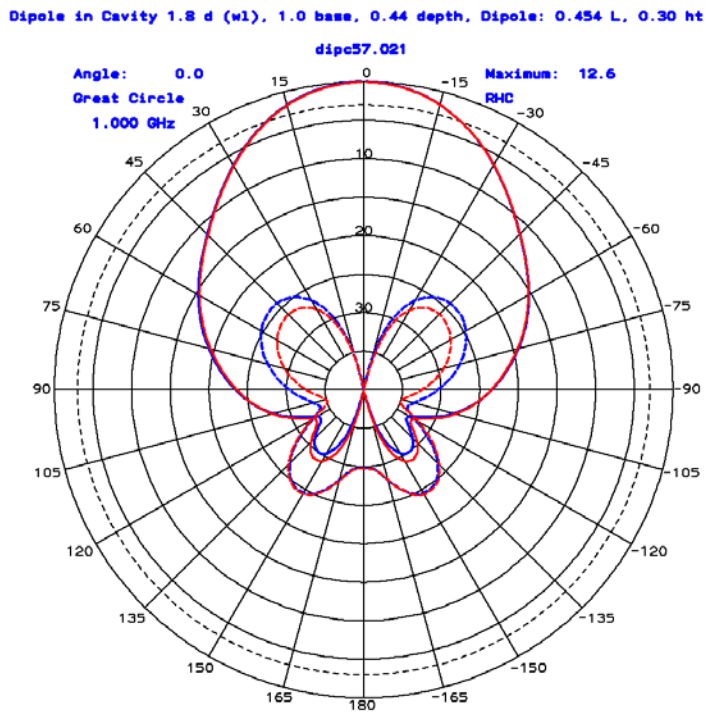


Chapter 5 Dipoles, Slots, and Loops

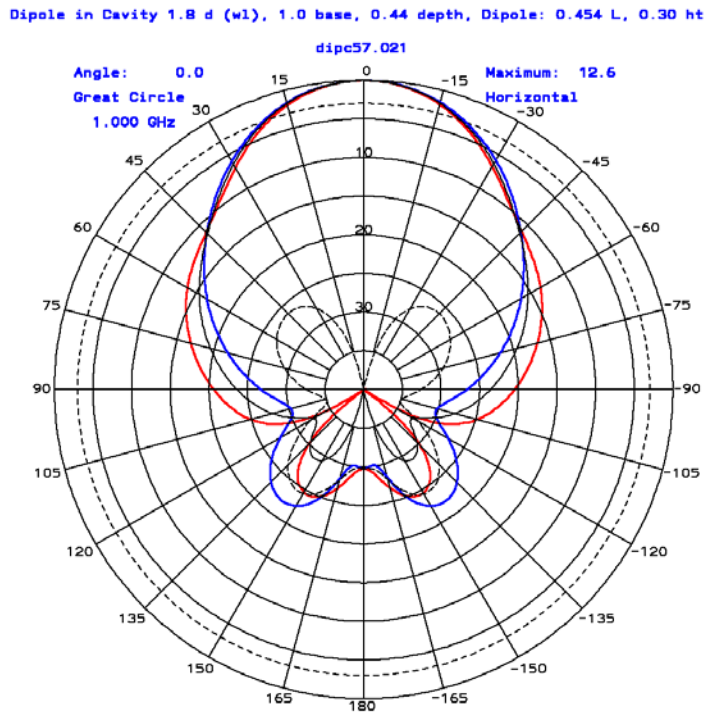


Cavity: 1.8λ Diameter Aperture, 0.44λ Depth, 1.0λ Diameter Base,
Dipole: 0.454λ , Height: 0.30λ

Circular Polarization Blue: $\phi = 0$, Red: $\phi = 45$



Linear Polarization Blue: $\phi = 0$, Red: $\phi = 90$, Black: $\phi = 45$



Chapter 5 Dipoles, Slots, and Loops

